MAY 7, 1956

STEEL

The Metalworking Weekly

A PENTON PUBLICATION

Technicians:

Extra Hands for the Engineer

—page 53

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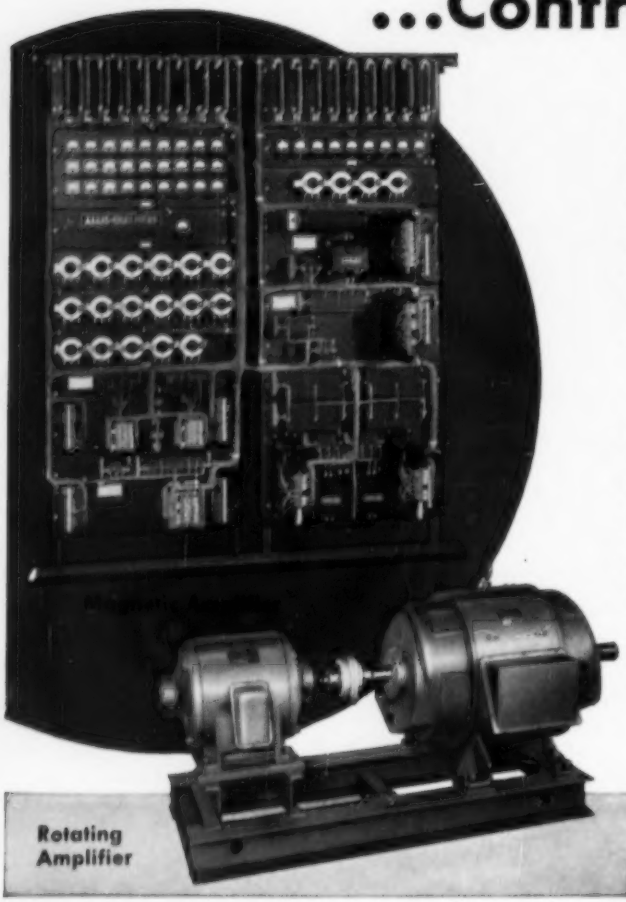
You get **MORE** when you Specify Allis-Chalmers

...More Mill Production ...Control Over Quality



Rotating Amplifier

The most important factor in meeting the challenge of more tonnage and improved quality is effective regulation. And effective regulation is more than a matter of good regulator design. It embraces overall *system* design . . . the integration of generators, exciters, motors, regulators and other control equipment. As manufacturer of all these interdependent components, Allis-Chalmers is in a unique position to provide this practical approach to mill regulation.

"Coordineered" System

Allis-Chalmers maintains separate departments, staffed by specialists, for each product. "Coordineering" results from an interdepartment exchange of ideas and technical information correlated in *one* department specializing in metals-producing industry application. All components are matched to meet the requirements of your job. Responsibility for system performance rests with one company.

For complete information, see your Allis-Chalmers representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

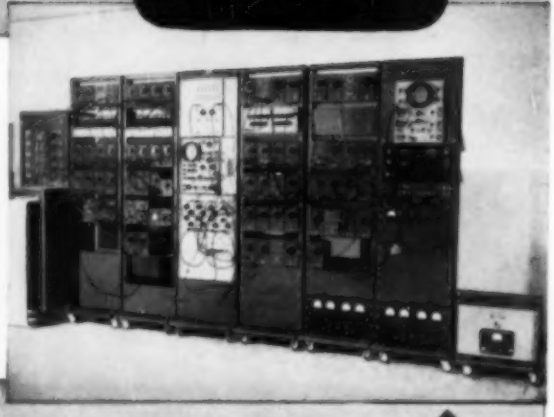
A-5029

ALLIS-CHALMERS
Regulators

Three Types of Reguiators Available

The following types of regulation are "coordineered" into an Allis-Chalmers system:

1. ***Regulex* Rotating Amplifier** — Applicable where high power levels for reversible output are desired.
2. **Magnetic Amplifier** — Applicable where low power levels for reversing or high power levels for non-reversing are desired.
3. **Combinations of *Regulex* Rotating and Magnetic Amplifiers** — Each complements the other for maximum efficiency.



Analytical Facilities Utilized...

System performance is simulated in the computers to get optimum configuration of components. The constants and exciter ceilings necessary for desired response are established.

Regulex is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Inspector at Rockford Acromatic Products Company checks a completely machined universal joint trunnion bearing.

The special-section bar stock as rolled by Bethlehem, together with the finished part, are shown below.

This bearing measures 2 ⅝ in. in width by 1 ⅛ in. in height.

Auto Parts Supplier Cuts Costs with Special Sections

Here's a technique that could help you cut production costs if you make a product in large quantities. One producer who has used it with outstanding success is Rockford Acromatic Products Company, of Rockford, Ill., specialist in automatic-machine products.

This company is busy turning out universal joint parts from Bethlehem special-section bar stock. Formerly made from individual blanks, they are now produced at far less cost. Feeding long lengths of carbon-steel bar special sections into their high-capacity automatic machines, Rockford Acromatic produces finish-machined bearings at the rate of 1 every 18 seconds per machine.

Bethlehem special sections are supplied in bar lengths that are especially suitable for automatic machining. But however your product is made, it may well pay you to investigate the use of special sections. By designing with a special section in mind, you can provide weight and strength where it is needed, while eliminating excess metal. You can get a high-quality product with reduced machining and scrap loss. This may mean big savings in your operations.

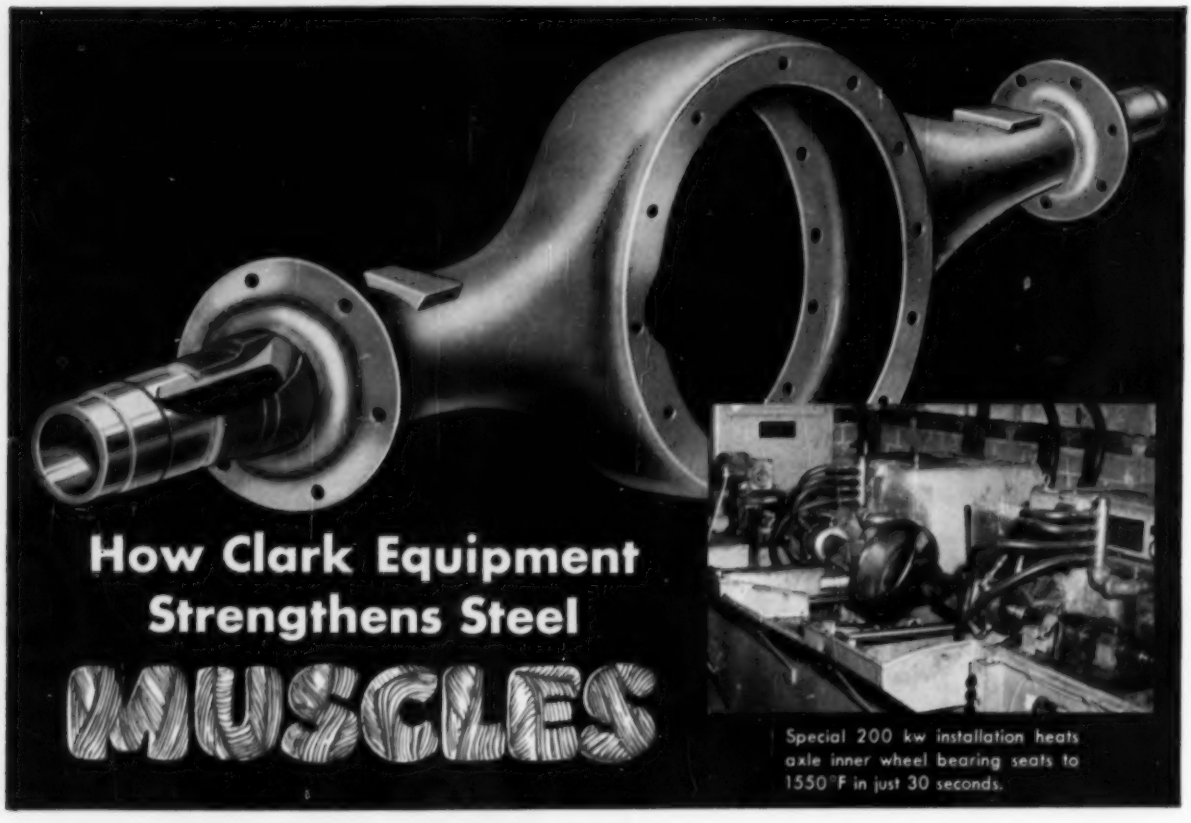
Let us give you more information about hot-rolled special sections, and how they could help you cut production costs. Please call the Bethlehem sales office nearest you.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



Special 200 kw installation heats axle inner wheel bearing seats to 1550°F in just 30 seconds.

with TOCCO* Induction Heating

Progressive engineers at Clark Equipment Company's Axle Division recently adopted TOCCO Induction Heating for hardening the inner wheel bearing seats of their axle housings. TOCCO*-hardening is strictly a "quality specification"—part of Clark's never-ending program of product improvement.

Look At These Results! After testing various methods of surface treatment including flame hardening and shot peening, TOCCO induction hardening was selected because the average improvement in fatigue life was greater than with any other type of surface treatment. The improvement in fatigue life with TOCCO equipment is approximately 400%.

In addition to improved fatigue life, surface wear resistance and improved grindability are achieved.

Fatigue test consisted of loading axle housing on spring seats to approximately twice the rated load and stroking at 180 cycles per minute.

Hardening Process	Per cent Improvement In Fatigue Life Over Standard Production
Shot Peening	50%
Flame Hardening	300%
TOCCO Induction Hardening	400%

In your search for ways to improve your product to meet today's tightening competition, don't overlook TOCCO as a sound means of improving product quality, increasing production speed and lowering production costs.

THE OHIO CRANKSHAFT COMPANY

*Trade Mark Reg. U. S. Pat. Off.

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. S-5, Cleveland 5, Ohio

Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating."

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____

Maneuverable BAKER "FT" Electric Trucks have lower silhouette, greater stability!

• Ability to maneuver safely and quickly in narrow aisles and tight places with large, heavy loads means more and faster work from new Baker "FT" electric trucks. Contributing factors are less overhang, lighter weight, lower silhouette, greater stability, shorter turning radius and greater forward tilt.

These new trucks have many other features for safe, more efficient operation. More convenient controls – right where operator wants them – are easy and simple to actuate. Absence of cowl and other obstructions means better visibility, greater ease in mounting and dismounting from either side. Dynamic braking means greater safety on ramps, smoother stops, more protection for truck and load. Self-energizing, self-equalizing hydraulic foot brakes and separate parking brake linked to driver's seat give added safety.

Capacities to 6000 pounds. Write for specific bulletins.

See Baker Trucks in action at the MHI Show June 5-8

THE BAKER-RAULANG COMPANY

1259 WEST 80th STREET • CLEVELAND 2, OHIO

Baker handling equipment

A subsidiary of Otis Elevator Company

68-4

See this "Show-Case" of VEEDER-ROOT COUNTERS...

at your Industrial Supply Distributor

Useful "facts-in-figures" on practically every machine, operation, system or process in industry can be supplied by Veeder-Root Counters for mechanical, electrical and manual operation. And now Veeder-Root Counters can be supplied from stock by certain leading Industrial Supply Distributors. Find out from your own distributor how they can add to the efficiency and *Countrol* of your plant operation. And if you are selling or designing equipment, contact Veeder-Root for engineering recommendations.

Insist on Standard VEEDER-ROOT COUNTERS

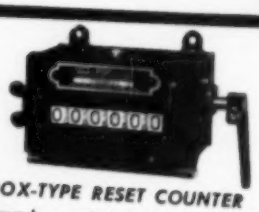
from your Industrial Supply Distributor or write us on special problems

SMALL RESET COUNTER

A compact, rugged reset counter for moderate duty in parts inspection, quality control, conveyors, machine tools, light presses, etc.

Dimensions: 1¾" long, 1 15/64" high, 1 1/16" wide

Speed: Up to 1000 counts per minute.



BOX-TYPE RESET COUNTER

For punch press installations, conveyors, metal-working equipment, die casting, plastic-molding, rivet, spring and wire machining, or any installation requiring a heavy duty counter.

Dimensions: 4¼" long, 2 1/32" high, 3⅜" wide.

Speed: 500 counts per minute.

RESET MAGNETIC COUNTER

For remote indication of machine operation from plant to office.

Dimensions: 3 15/16" long, 2½" high, 1⅝" wide.

Speed: Up to 1000 counts per minute.

Coils: 110V-AC are standard. Other voltages are available. Panel mounting feature also available.

HAND TALLY

For quick spot-checks of production or performance.

Dimensions: 1 11/64" long (to end of reset knob), 1¾" deep, 2" high.

Counts one for each depression of the thumb lever, and resets to zero by a turn of the knob.

CLUTCH SPEED COUNTER

For checking to make sure that the machine is operating at the required R.P.M.

Dimensions: 3¼" long, ⅞" max. diameter. Non-Reset.

Internal clutch operates counter only when rubber tip is pressed against the shaft.

Everyone Can Count on

VEEDER-ROOT

"The Name that Counts"

HARTFORD 2, CONN.

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STEEL
The Metalworking Weekly

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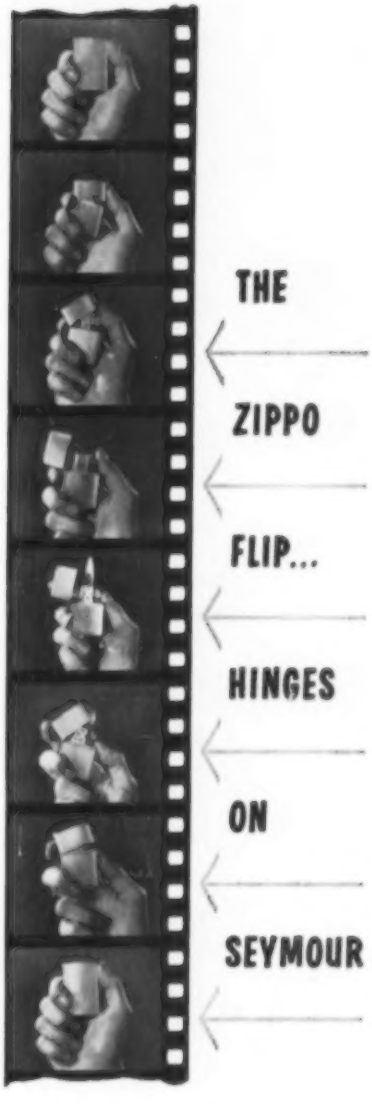


Zippo lighters "flip their lids" on hinges made of SEYMOUR NICKEL SILVER—the metal that combines beauty with durability. Malleable and ductile, this fine metal is found wherever uniform high quality is demanded. Nickel silver users everywhere say . . .
"Specify Seymour—you KNOW it's good!"

SEYMOUR

THE SEYMOUR MANUFACTURING CO.
3 Franklin Street, Seymour, Connecticut

DEPENDABLE
QUALITY • PRICE • SERVICE
Electro-manganese®
99.9+%
STANDARD OF THE WORLD FOR PURITY
MN®

ALSO AVAILABLE
Nitrelmang®
A Stable Nitrided ELECTROMANGANESE
Both made by the pioneer producer of electrolytic manganese.
FOOTE MINERAL COMPANY
Electro-manganese DIVISION
BOX 479 • KNOXVILLE, TENNESSEE
WRITE FOR BOOKLET

behind the scenes

Dimes to Dollars

STEEL's editors were invited by Yale & Towne, the industrial truck manufacturer, to attend a sales demonstration. Customers and prospects were assembled from the Ohio coast and adjacent hinterlands to see with their own eyes precisely what the company's industrial trucks could do. True, these guests did a little free loading before the lift trucks went into their act, but interest in refreshments soon faded when Y&T salesmen reversed inflation and changed dimes into dollars.

To demonstrate maneuverability, drivers would solicit a dime from some amenable viewer, place it on the floor, and then wheel their trucks about the coin in tight circles. Naturally, this attracted earnest attention. At the end of the demonstration, the driver would return the coin—but, strangely enough, it always turned into a bright, new silver dollar.

As a sales gimmick, it demonstrated the savings that could be effected through the use of Yale & Towne industrial lift trucks. It also demonstrated the cupidity that rises in manly hearts when an opportunity presents itself to invest money in the expectation of reaping a 900-percent return.

"I don't know for sure how things went after I left," grinned Associate Editor Van Caldwell, "but while I was there, you could have sold dimes at a nice premium."

How To Run Away

When Cal Fisher isn't assisting eastern metalworking sales personnel with their marketing problems (Calvin Fisher Jr., STEEL's advertising representative, 12 Farmstead Lane, Farmington, Conn.—Advt.), he keeps casting about for items that may be appropriate for this page. He sends them to Editor-in-Chief Irwin Such, or to Associate Managing Editor John Morgan, with earnest recommendations that certain segments of the metalworking world might be titillated, informed, amused or impressed by said items.

Sometimes Cal is touched by the profound philosophy of Edgar Guest, but golly, Cal, we can't just up and print copyrighted stuff. This time, however, Cal comes up with a real titillater: It is a list of methods by which one may run away from a problem. Here are some of the 30 listed:

1. Find a scapegoat and ride him. Executives can always blame non-executives, etc.
2. Say that we must not move too rapidly. This avoids the necessity of getting started.
3. When in a tight place, say something which the group cannot understand.
4. Ask what is meant by the question. When it is clarified, there will be no time left for the answer.
5. Appoint a committee.

Signs of the Times

Several days ago rapid Robert Huber, STEEL's go-go-go machine tool editor, found himself in Cincinnati, which is a silly expression when you come to think of it, isn't it? Makes you think of an amnesia victim just snapping out of it. Well, Bob was attending the University of Cincinnati's "Program of Progress" with the idea of picking up some points on the growth of the co-operative plan of education for a Program for Management article—it's scheduled to appear in STEEL next fail. Incidentally, the co-operative plan of education originated 50 years ago in Cincinnati, and is now used by nearly 40 institutions. On his way to one of the sessions, Bob passed a casket manufacturing company that had this sign in the window:

ELECTRICALLY REFRIGERATED CASKETS
Do It the Merciful Way

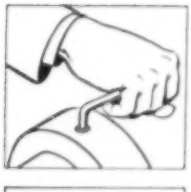
He has been wondering about it ever since, feeling just a little bit guilty for society; obviously, it has been unmerciful up to the age of the refrigerated casket.

Shrdlu

(Metalworking Outlook—Page 47)

Greater resistance to removal holds Allenpoints tighter in your products

Tests prove that ALLENPOINT Set Screws have up to 50% HIGHER WITHDRAWAL TORQUE than serrated point set screws



HIGHER WITHDRAWAL TORQUE WITH ALLENPOINTS! In ¼" x ¼" sizes, tightened to shear point of key, Allenpoints required 75 inch-pounds removal torque. Serrated point set screws gave up their hold at only 50 inch-pounds removal torque.

ONE MORE FULL THREAD WITH ALLENPOINTS! Compare, and you'll find that Allenpoints have *one more full thread* than same size serrated point set screws. That means greater holding power, especially in the much-used "square" sizes.

CLEANER, MORE UNIFORM SOCKETS WITH ALLENPOINTS! Allenpoint sockets are *"pressur-formd"* to preserve the long fibers of the steel uncut throughout the *entire* length of the screw. This makes a deep socket of maximum strength and accuracy, in which the key seats with great exactness.

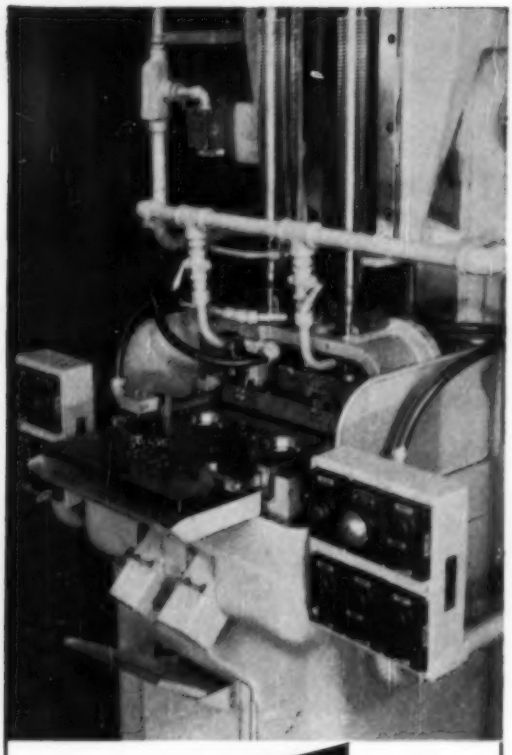
Specify ALLENPOINTS for far greater *holding* power — the kind of fastenings that "stay put". Genuine Allenpoints and other Allen fasteners are available from your Industrial Distributor — standard items immediately, special items very promptly. Write for full information.

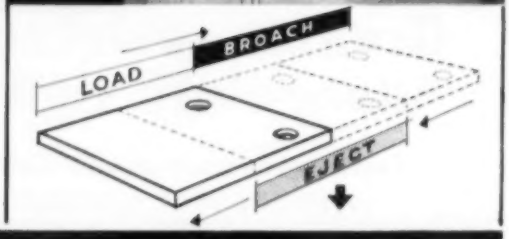
You want maximum holding power from every set screw in your product. Here's why you'll get that from ALLENPOINT ○ Set Screws: Allenpoints and serrated point set screws were recently compared in laboratory tests. They were the kind of tests you'd make in your own plant — random samples of each were chosen from regular stock boxes from distributors' shelves.

In each test, keys were tightened right up to the shear point — maximum tightening point for any set screw. Up to 50% HIGHER WITHDRAWAL TORQUE was required to release the ALLENPOINT ○ Set Screws.

Translated into your own product, this means more dependable fastening with ALLENPOINTS.

Modern bike gearing





Another *American* First

45 GEAR TEETH BROACHED IN 360 RING GEARS PER HOUR

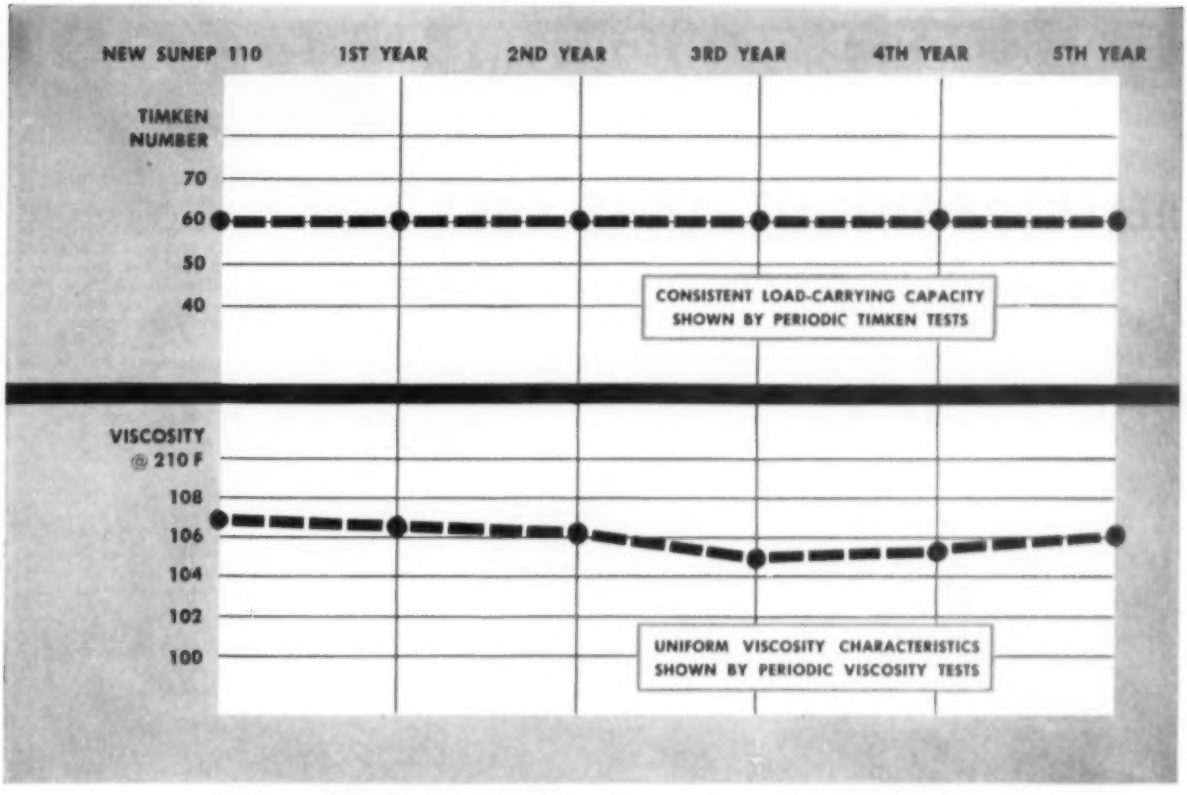
Here, an American 3-Way, pull-down broaching machine broaches 45 teeth in the ring gear for a two-speed bicycle transmission — two gears with each pass, 360 pieces per hour. A two-station fixture mounted on a 3-position hydraulic slide moves the parts into broaching position. The parts are broached after which the slide moves back, automatically ejecting the parts. The operator reloads while the broaches return. The machine can be run on automatic cycle. The operator only has to feed parts to the fixture.

American 3-Way Broaching Machines can be supplied with either electrical or manual controls, with fixtures and broaches designed to your requirements. Write for Catalog No. 101.

AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



Taken from the records of a major steel producer, the above graphs show the life record of a Sunep gear lubricant used in a 3-stand, 4-high cold-rolling mill. *With no make-up,* Sunep is as good as new after running more than 30,000 hours.

Steel company tests show:

SUNEP EXTREME-PRESSURE LUBRICANT REDUCES OIL AND MAINTENANCE COSTS

Sunep® lubricants help cut over-all oil costs because they have a long service life. They are made from high-quality base oils... unusual in the manufacture of extreme-pressure lubricants ...and because of this, are outstanding in their resistance to oxidation. They will not thicken or thin out in operation and will separate easily from water. Most important, they will last years longer than ordinary gear lubricants.

Sunep lubricants help keep maintenance down because they don't lose their e.p. qualities. They are specially blended to prevent "fall-out" of the extreme-pressure ingredients in service... a frequent and hidden cause of gear failure.

Sunep lubricants protect bearings and gears against rust and corrosion... an added help in reducing maintenance costs.

For complete information about Sunep lubricants see your Sun representative, or write for free Technical Bulletin 32. Address SUN OIL COMPANY, Philadelphia 3, Pa., Dept. S-5.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY Philadelphia 3, Pa.

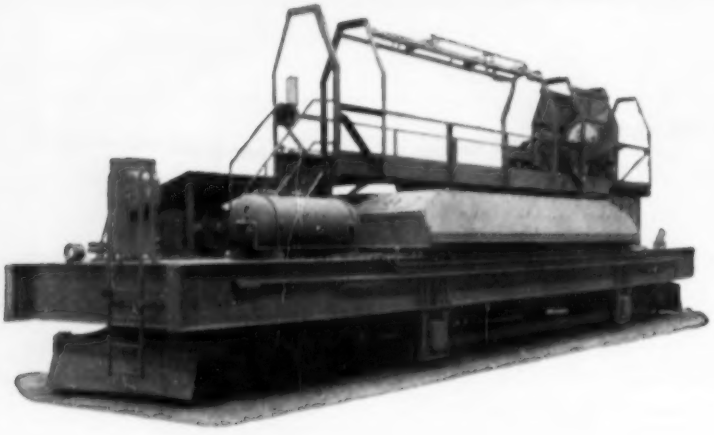
IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

STOCK HOUSE OR HIGH LINE

operators prefer the

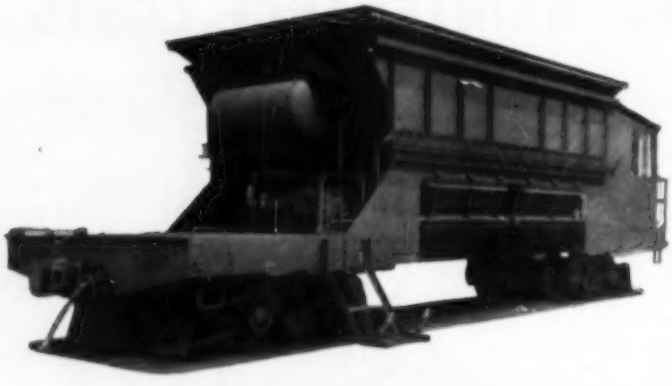
DEPENDABILITY OF ATLAS CARS

These specially designed units are another example of the ruggedness of Atlas Cars. Their dependability helps maintain the most rigid furnace charging cycles.



40-TON SCALE CAR

Double Hopper Bottom Dump



75-TON ORE TRANSFER

Gable Bottom Double Side Dump

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

LETTERS
TO THE EDITORS

Firm Faces Welding Problem

The article, "Tailored Tools Meet Schedules" (Apr. 9, page 132), is of interest to us since it shows in a photo that Ryan Aeronautical Co. has solved a welding problem which we face.

As piping fabricators, we frequently are required to Heliarc-weld the root pass on large diameter pipe without a backing ring. The problem involves the designing of a variable-diameter copper back-up fixture, plus finding an economical means of gas shielding.

We would appreciate more information concerning Ryan's method and equipment.

D. R. Rasmusson
Methods Engineer
Cornell & Underhill Inc.
Hoboken, N. J.

• *We suggest you write William P. Brotherton, assistant director of public relations, Ryan Aeronautical Co., San Diego, Calif.*

Brainstorming for Other Half

It seems to me that the brainstorming idea described in the third article of the 1956 Program for Management series, "Ideas for Industry" (Apr. 23, page 105), might work just as well to solve church problems.

In our church, we have a problem with our building program. After raising funds based on preliminary estimates, bids came in 50 per cent higher.

A brainstorming session possibly could point the way to a solution. Please send 12 reprints.

L. Eugene Wettling
Executive Committee-Western Traffic Association
Statistical Bureau
Chicago

Please send ten reprints for circulation among plant personnel. This article seems highly adequate to sell such a technique to others. My compliments on a good presentation.

F. H. Williams
Industrial Engineer
United States Steel Corp.
Vandergrift, Pa.

Comment Motivates Query

In your 1956 Metalworking Yearbook and Planning Guide issue, (Jan. 2, 1956), a comment by W. E. Knapp appeared in the "Forum on Technical Progress" (page 252).

Although I did not see it, I am told he stated that the addition of rare earth metal alloys in the ladle permits good workability with lead contents of three or four times higher than the former

(Please turn to page 12)

Sheffield Tube Corporation reports: *Kemp Melting Pot melts 2,200 lbs. of lead per hour, eliminates down-time*

The Sheffield Tube Corporation, New London, Conn., manufactures tubes for toothpaste, cosmetics, drug specialties and similar products. Slugs for extruding are punched from thin lead sheets, which are rolled from moulded slabs. To melt large "pigs" for moulding these slabs, Sheffield formerly used three pots: two meltdown pots, feeding into a 1,276 lb. capacity holding pot. This equipment has been replaced by one Kemp Immersion Melting Pot, capable of melting 2,200 lbs. of lead per hour.

Kemp boosts production . . . cuts down-time

Formerly, one man produced about 500 slabs daily; dross formation had to be removed two or three times daily; and the pots were replaced after anywhere from 6 weeks to 6 months of operation. With the Kemp Melting Pot, two men now mould about 1,400 slabs daily. During the first 5 weeks of service dross was not removed once—and except for an occasional 10-minute valve-cleaning job there was no down-time at all.

Kemp can help you

Whatever your application, it will pay you to investigate Kemp Melting Pots. You'll benefit in many ways: Kemp units are not subject to periodic and expensive breakdowns . . . offer greater heating surface, faster heat recovery, lower dross formation, lower room temperatures. Whatever your problem, Kemp units will help cut labor costs, eliminate lost time, increase output.

Find out how Kemp engineers can provide the most profitable solution to your heating or melting problems. Write for Bulletin IE-10 today.

KEMP OF BALTIMORE

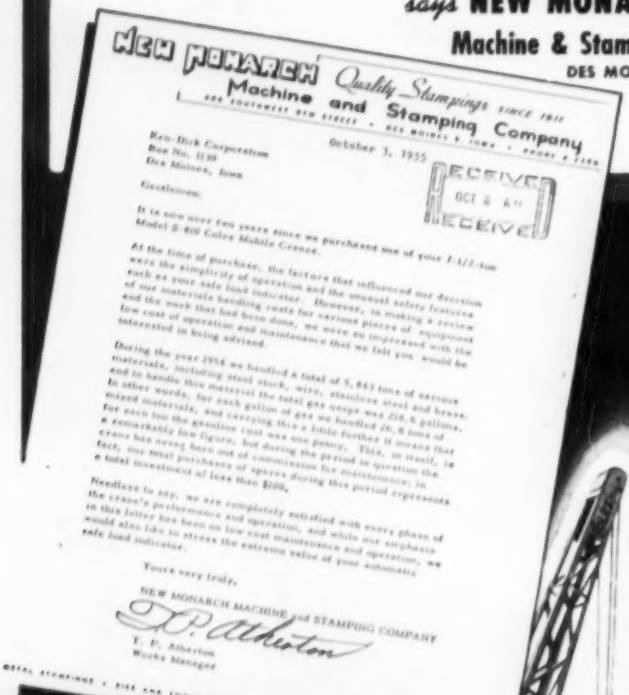
IMMERSION MELTING POTS

CARBURETORS • BURNERS • FIRECHECKS • ATMOSPHERE & INERT GAS GENERATORS • ADSORPTIVE DRYERS SINGEING EQUIPMENT

THE C. M. KEMP MFG. CO.
405 East Oliver Street, Baltimore 2, Maryland

"SIMPLICITY of OPERATION— UNUSUAL SAFETY FEATURES are the factors that influenced us to purchase..."

says **NEW MONARCH Machine & Stamping Co.**
DES MOINES, IOWA


NEW MONARCH Machine and Stamping Company
Quality Stampings SINCE 1911
October 3, 1955
Gentlemen:
At the time of purchase, the factors that influenced our decision were the simplicity of operation and the unusual safety features such as your safe load indicator. However, in making a review of our materials handling costs for various pieces of equipment and the work that had been done, we were so impressed with the low cost of operation and maintenance that we felt you would be interested in being advised.
During the year 1954 we handled a total of 5,843 tons of various materials, including steel stock, wire, stainless steel and brass, and to handle this material the total gas usage was 258.6 gallons. In other words, for each gallon of gas we handled 26.6 tons of mixed materials, and carrying this a little further it means that for each ton the gasoline cost was one penny. This, in itself, is a remarkably low figure, but during the period in question the crane has never been out of commission for maintenance; in fact, our only purchases of spares during this period represents a total investment of less than $100.
Needless to say, we are completely satisfied with every phase of the crane's performance and operation, and while our emphasis in this letter has been on low cost maintenance and operation, we would also like to stress the extreme value of your automatic safe load indicator.
Yours very truly,
NEW MONARCH MACHINE and STAMPING COMPANY
T. F. Atherton
Works Manager

The only CRANE with ONE YEAR WARRANTY
See Our Exhibit at The MATERIAL HANDLING INSTITUTE EXPOSITION Cleveland, Ohio June 5 to 8, 1956

COLES CRANES

Write for FACTUAL DATA

COLES CRANES, INC.
Joliet 7, Illinois

LETTERS

(Concluded from page 10)

tolerable limit in some nonferrous alloys, such as cartridge brass.

I would like to investigate the matter more thoroughly. Where may I get in touch with Mr. Knapp?

L. H. Decker
Manager
Chemical & Metallurgical Section
Research Department
Revere Copper & Brass Inc.
Rome, N. Y.

• *He is vice president of American Metallurgical Products Co. Inc., 3600 Forbes St., Pittsburgh 13, Pa.*

Ratios Interest Reader

Please send a copy of the article, "Taming Supersonic Heat" (Apr. 9, page 112). The information on temperature-strength relationships is of definite interest.

W. T. Paulson
Supervising Engineer
Coated Abrasive Division
Carborundum Co.
Niagara Falls, N. Y.

Editorial Impresses President

Our president, R. C. Renner, was so impressed with your editorial, "Case for the Craftsman" (Apr. 9, page 63), that he feels it would make excellent reading material for our employee reading rack. May we have 25 copies?

R. H. Hagan
Personnel Manager
East Dayton Tool & Die Co.
Dayton, O.

Key Engineers To See Story

We read with interest the story, "What Specifications Mean to You" (Apr. 16, page 92). In our opinion, this article is so good that we would like to have 12 copies to pass around to our key personnel.

F. M. Gutt
Chief Engineer
Met-L-Wood Corp.
Chicago

We would appreciate your sending six copies to us.

H. S. Freynik
Vice President
Riverside Metal Co. Division
H. K. Porter Company Inc.
Riverside, N. J.

Problem Exists in All Offices

I am impressed with the article, "Use Office Engineering: Save Money, Time" (Apr. 9, page 76) and I would appreciate six reprints.

It seems that the problems discussed is not unique. It would be no exaggeration to state that it exists in one form or another in every office.

Leo Liberthson
Technical Director
Building Products Division
L. Sonneborn Sons Inc.
New York

Any way you look at it...

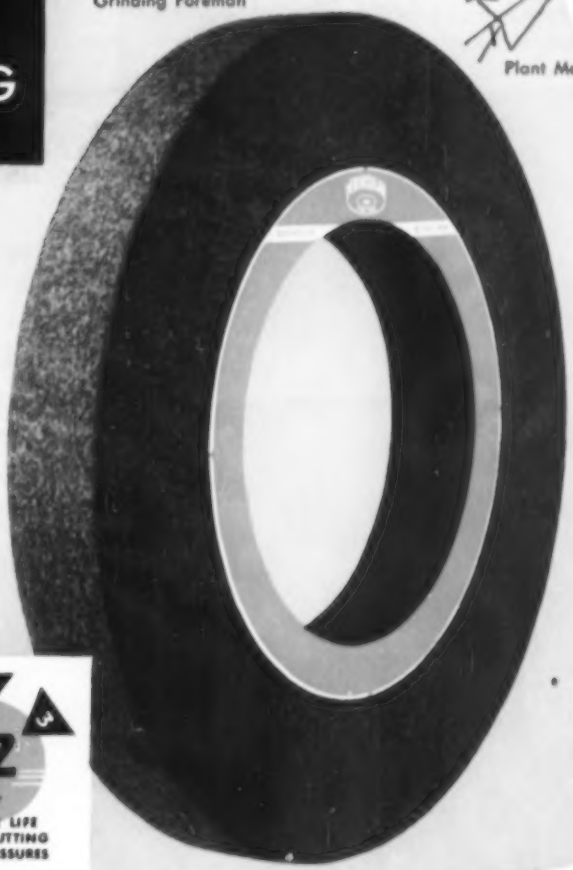
PENINSULAR'S NEW "3Z" WHEEL IS TOPS FOR BETTER SLAB, BILLET AND HEAVY DUTY GRINDING

Grinding Foreman

Plant Manager

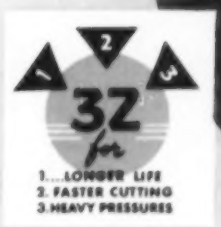
President

Cost Accountant



Operator

Purchasing Agent



The New Peninsular "3Z" Wheel's unusual combination of extra-dense, lasting structure and faster-cutting action meets the approval of managers, foremen, and operators. Managers appreciate the greater profit that results from using a "3Z" Wheel. Foremen approve the longer life of the "3Z" Wheel —there's less downtime to worry about. Operators are sold on the record-breaking grinding action of the "3Z" Wheel, for this ups production and makes for easier handling—cuts worker fatigue to a minimum. You can prove to your own satisfaction there's no grinding wheel quite like the New Peninsular "3Z" unit. Peninsular abrasive engineers will call and show you how your toughest slab, billet or other heavy duty grinding problem can be solved by this latest Peninsular advancement in abrasive engineering.

Wire or write us today.

PENINSULAR

GRINDING PENINSULAR WHEELS

PENINSULAR GRINDING WHEEL DIVISION—ABRASIVE AND METAL PRODUCTS COMPANY—DETROIT, MICHIGAN

"We have no operating problems

Midwest Metal Stamping reports results of 8 years of press operation using STANOIL

In 1948, Midwest Metal Stamping Company, Kellogg, Iowa, put into service a Bliss Hydro Dynamic Press. STANOIL Industrial Oil was selected as the hydraulic medium. The initial fill was 1,400 gallons. The press operated continuously from 1948 until Christmas, 1954, when it was shut down five days for overhaul.

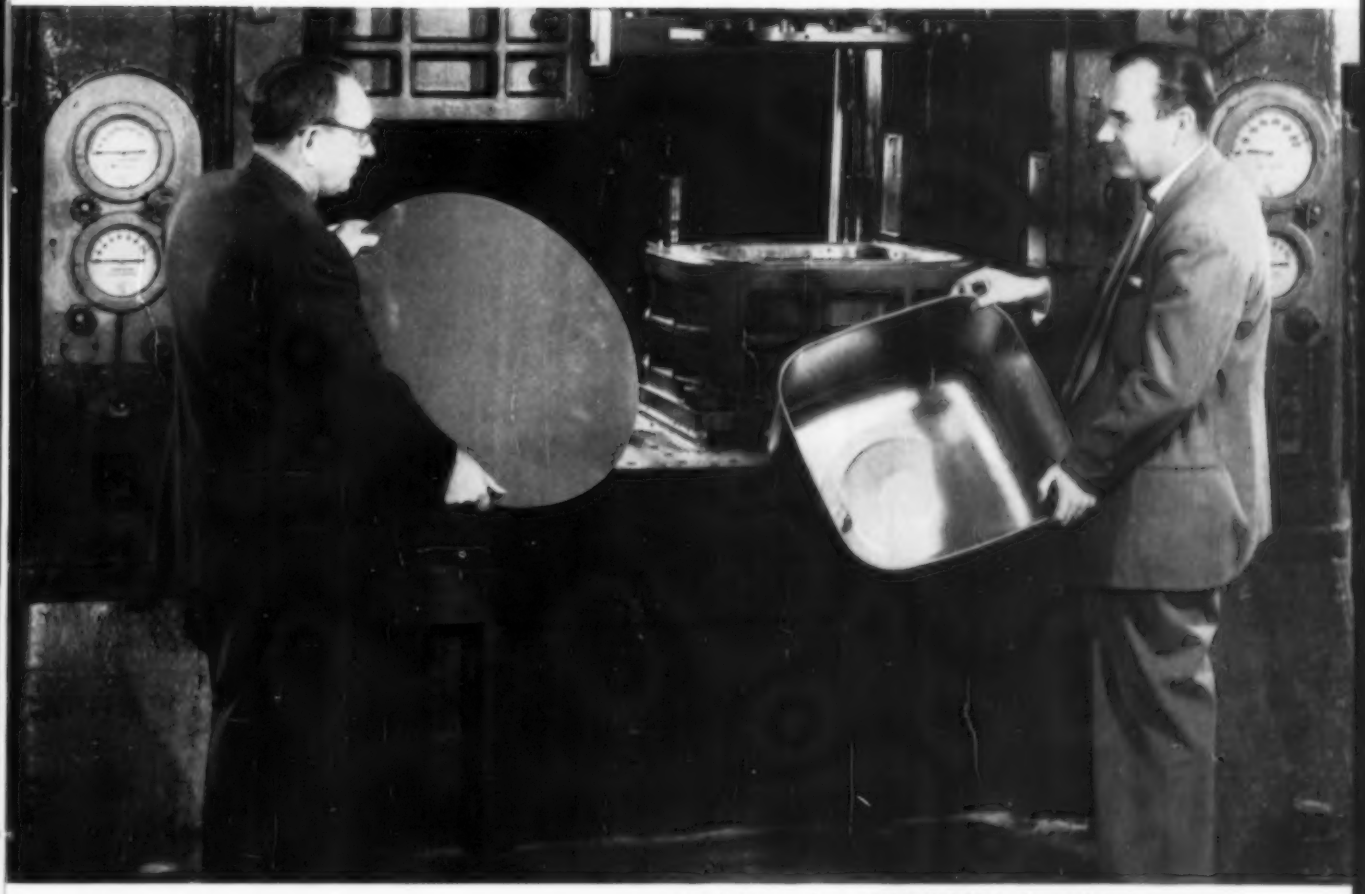
Stamping being removed from press by operator George Johnson. Press has used STANOIL Industrial Oil as hydraulic medium for eight years. Oil has perfect performance record.

At the time of overhaul, the STANOIL Industrial Oil was drained. And here STANOIL's superior demulsibility was demonstrated. Due to the high rate of condensation, two barrels of water were removed from oil reservoir. An oil analysis in the Standard Oil laboratory proved the oil still suitable for continued service. After filtration, it was returned to the reservoir and the press put back in operation. STANOIL continues to deliver the same perfect performance for Midwest as before.

STANOIL Industrial Oil can perform just as efficiently for you. Find out. There is a Standard Oil industrial lubrication specialist near you in any one of the Midwest and Rocky Mountain states. Call him. Or write Standard Oil Company, 910 South Michigan Ave., Chicago 80, Illinois.

when we use STANOIL Industrial Oil"

Don Foster, Midwest Stamping Purchasing Agent and Jesse Nelson (right), Standard Oil industrial lubrication specialist, display metal blank and finished tub turned out on Bliss press. Technical service on lubrication problems is Jesse Nelson's job. He's been doing such work for seven years. Jesse has an engineering degree from the University of Iowa and is a graduate of the Standard Oil Sales Engineering School. Customers find this experience and training pay off *for them.*



Quick facts about ***STANOIL*** *Industrial Oil*

- **Special refining and an additive, exclusive with STANOIL, make this industrial oil resistant to chemical change.**
- **In all grades of STANOIL that need it, an advanced type corrosion inhibitor is added. Inhibitor "plates out" on metal surfaces, prevents rust.**
- **Selective refining and special additives give STANOIL low pour point. STANOIL flows freely at low temperatures.**
- **High viscosity index of STANOIL is indication of the oil's ability to resist change at any operating temperature.**
- **No foam, no emulsion with STANOIL. STANOIL's special additive and selective refining minimize or eliminate these oil problems.**
- **Low carbon forming tendencies of STANOIL reduce or eliminate this problem.**

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STANDARD OIL COMPANY
(Indiana)

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
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We specialize in
FINISHED STEEL
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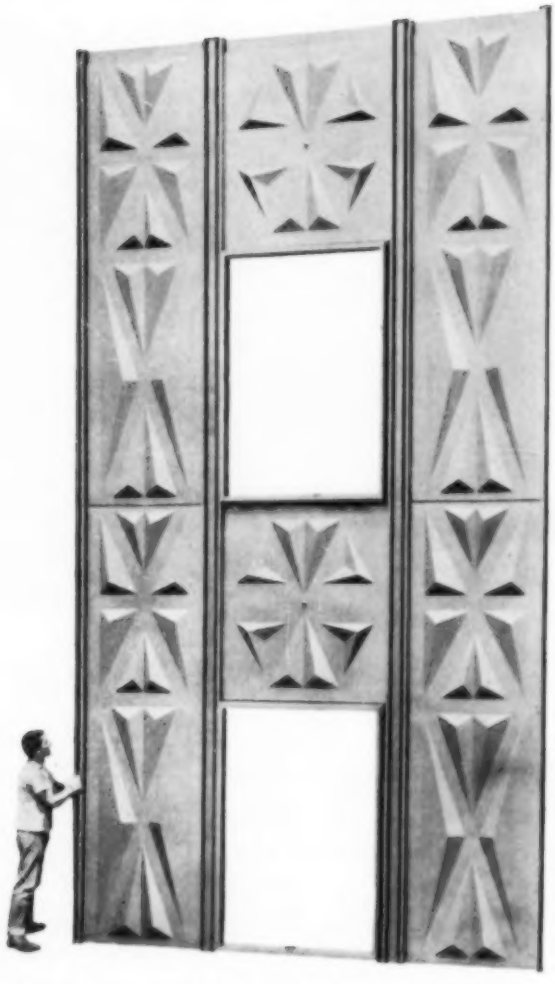


NOW... ONE-PIECE PANEL STAMPINGS 7' by 15½'

Commercial Shearing fabricates stainless steel, aluminum and porcelain enameling steel

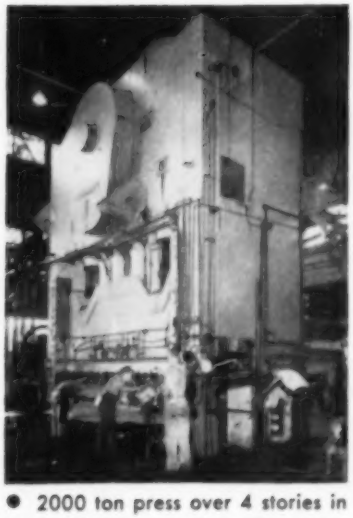
Here is one example of the type of panels and spandrels "Commercial" has fabricated through close cooperation between engineer and architect.

There's a huge 2000 ton press in Youngstown, Ohio, that means new possibilities in curtain wall design. For, now, panels and spandrels up to 7 ft. by 15½ ft. can be walloped out as single stampings . . . and, they roll off the press at a rate as high as 500 sections per day. Fast delivery—plus lower construction costs, because larger sections mean fewer pieces to handle.

Our "know-how" in architectural wall stamping stems from 30 years of experience in producing steel tunnel lining segments and air base landing mats. This knowledge permits you greater latitude in planning for the use of large panels; for once you have conceived the basic design and pattern, our engineers team with you to work out practical fabrication details and methods.

Whether you need large panels for the skin of a metal-clad building or for some other application, we can contribute to the teamwork necessary to produce a well-designed product, yet one that can be economically fabricated.

For further information, write today to Dept. L-19, The Commercial Shearing and Stamping Co., Youngstown, Ohio.



● 2000 ton press over 4 stories in height forms any size ornamental panel in varying dimensions up to 7' by 15½' from any suitable metal.

● 7000 stainless steel panels were fabricated at Commercial Shearing and Stamping for the exterior skin of the new Socony-Mobil Building.

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shearing and stamping

WIN a 2-weeks LUXURY

All Expenses Paid,

ENTER JONES & LAMSON'S

NEW HORIZONS

Grand Prize:

Two-Weeks Luxury Vacation Trip for Two, All Expenses Paid, to a choice of one of the following: Paris, Hawaii, The Caribbean, The Canadian Rockies, Plus $400 for spending money, baby sitter fee, etc.

Two 2nd Prizes: Each a Seven-Day All-Expenses-Paid Luxury Vacation for Two to Bermuda. Plus $200 spending money.

Three 3rd Prizes: Each a Shopmaster Combination Saw-Jointer Power Tool, complete with motor.

Ten 4th Prizes: Each a Shopmaster Individual Single-Purpose Power Tool (A Choice of Saw, Drill Press, Jointer, etc.)

Jones & Lamson, famed for opening up NEW HORIZONS in metalworking efficiency, now offers you, personally, NEW HORIZONS — a luxury vacation for two people for two weeks with all expenses paid, to your choice of Paris, Hawaii, The Caribbean or The Canadian Rockies.

Think of it — you can enjoy deluxe travel, finest hotels and accommodations, the very best of everything, plus $400 spending money. Live like a millionaire for two weeks, for just answering this question, "Which Jones & Lamson machine, or machine feature, could, or does, help you most, and Why?"

When you write in (use coupon or not, as you wish), we will send you an official entry form, together with information upon which to base your answer. So don't delay! Even if you've never entered any contest before . . . if you have a good idea and can express it clearly — *YOU* may win this glorious luxury vacation for two! And don't forget — there are other prizes! — two deluxe 7-day all-expenses-paid vacations for two to Bermuda, and 13 prizes of famous Shopmaster home workshop Power Tools! Enter *today!* Read the simple rules, and send in this coupon *NOW!*

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to your choice of . . .

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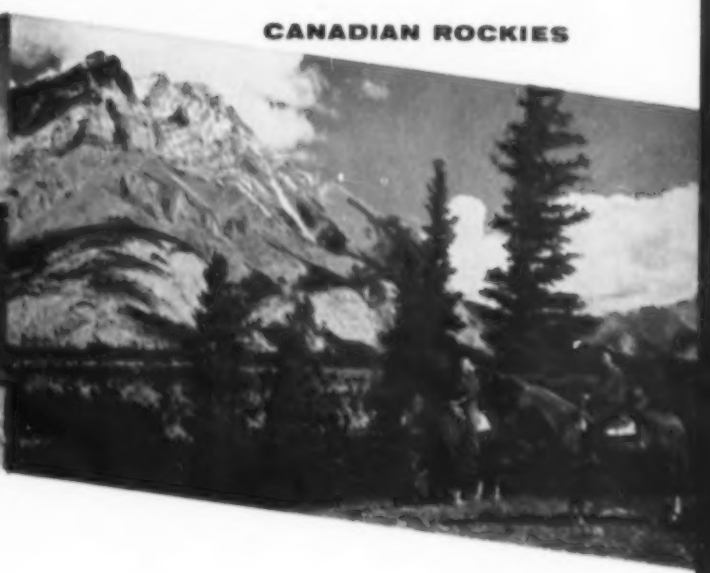


CONTEST TODAY!

CONTEST RULES

Contest is open to all persons, residing in the continental U. S. A., engaged in metalworking or allied industries, except employees of Jones & Lamson Machine Company, its selling agents and its advertising agency, and members of their families.

Contestants merely answer, in 150 words or less, the question "Which Jones & Lamson Machine, or Machine Feature, could, or does, help you most, and Why?"

Entries are to be mailed to Jones & Lamson NEW HORIZONS CONTEST, Box 364, Back Bay Annex, Boston 17, Massachusetts.

Entry must be contestant's own, and must be handprinted or typed on an official Jones & Lamson NEW HORIZONS CONTEST entry form. Entry forms that are not completely filled out will be disqualified. Entry forms filled out in handwriting will also be disqualified. No entries will be returned, and all entries become the property of Jones & Lamson Machine Company.

The submitting of a contest entry implies the contestant's agreement with and submission to all contest rules. Contest entries must be postmarked by midnight July 10, 1956 and received by July 20, 1956.

Board of Judges will include machine tool engineers, production foremen, business executives, trade publication editors, and an engineering college faculty member.

Judges' decisions are final. Entries will be judged for aptness of thought, originality and sincerity. "Literary style", as such, will *not* be a deciding factor. Elaborate or "fancy" entries will receive no extra consideration.

Winners will be announced in Jones & Lamson Machine Company advertisements in trade publications as soon as possible after the judging of the contest.

Easy to Enter! You Could Win!

JONES & LAMSON MACHINE COMPANY
517 Clinton Street, Springfield, Vermont

Please send official NEW HORIZONS CONTEST entry form and information to:

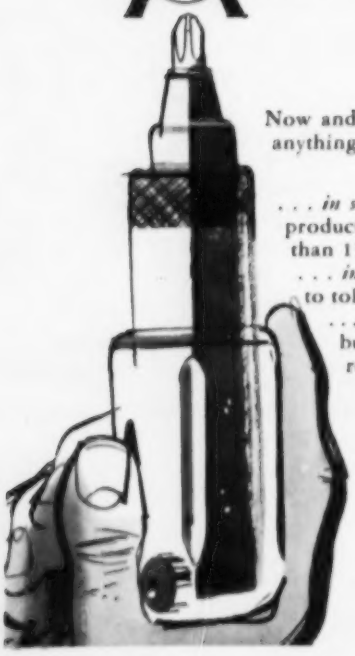
*Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

They may APPEAR the same, but...

American is the name!



Examine your fastening costs and you will find four factors:

1. price **2. service**
3. quality **4. research**

Now and then you may find a temporary price differential you feel may be worth anything to you. But no one gives you more of all four than American.

AMERICAN GIVES YOU MORE OF ALL FOUR

. . . *in service*, where American is noted for keying deliveries to the most precise production schedules. Like a storm door and window manufacturer who uses more than 15 million American Phillips fasteners a year.

. . . *in quality*, backed by controls that produce standard units with tools made to tolerances closer than generally used by other manufacturers.

. . . *in research*, where American not only developed the Phillips Head fastener, but helped one manufacturer switch from an expensive, milled-from-the-bar refrigerator bolt to a simple, inexpensive cold-headed unit.

If this sounds like it could be worth money to you to explore, you're right. And nowhere will you find more of the four basic features you want than from American — price, service, quality and research.

Make your own comparisons . . . send us your inquiry for price and delivery or your specifications for special fasteners. Write:

American!

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NORRISTOWN, PA. • CHICAGO, ILL. • DETROIT, MICHIGAN

a new development in powdered metals

Quali-SINT is the latest addition to the extensive manufacturing facilities of Burgess-Norton, producers of precision parts for industry for over 50 years. The development of Quali-SINT is the result of an intensive program of research and production, and represents the highest degree of sintered metal skill commercially possible. This superior quality is produced by teaming the most advanced materials, methods and equipment with the highly developed Burgess-Norton system of quality control.

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Basic minimum tensile for Quali-SINT parts is 50,000 psi and minimum density is 6.2 g/cc. This greater strength permits a much broader use of Quali-SINT parts than ordinary sintered metal parts.

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Exclusive B-N controls in tooling, blending, compacting, sintering and inspection provide unmatched uniformity in both structure and dimension...from part-to-part and run-to-run.

LOWER FINAL COSTS

The closer tolerances and rigid adherence to specifications cut costs by reducing or completely eliminating many subsequent operations such as machining, cleaning and inspection at the user's plant.

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Quali-SINT

another development in precision parts production by

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A CINCINNATI PRESS BRAKE

accurately forms this difficult shape

Cincinnati Features

Insure this Accurate Performance

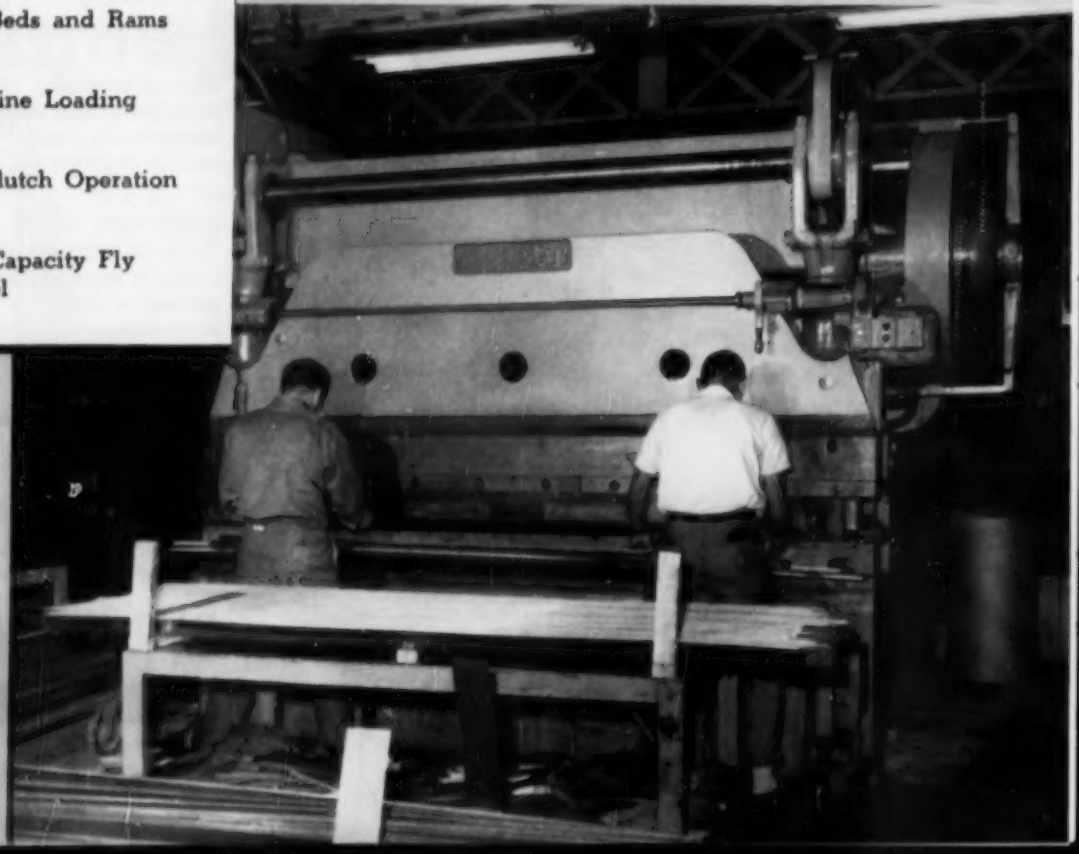
- All-Steel Interlocked Frame
- Deep Beds and Rams
- Centerline Loading
- Easy Clutch Operation
- Large Capacity Fly Wheel

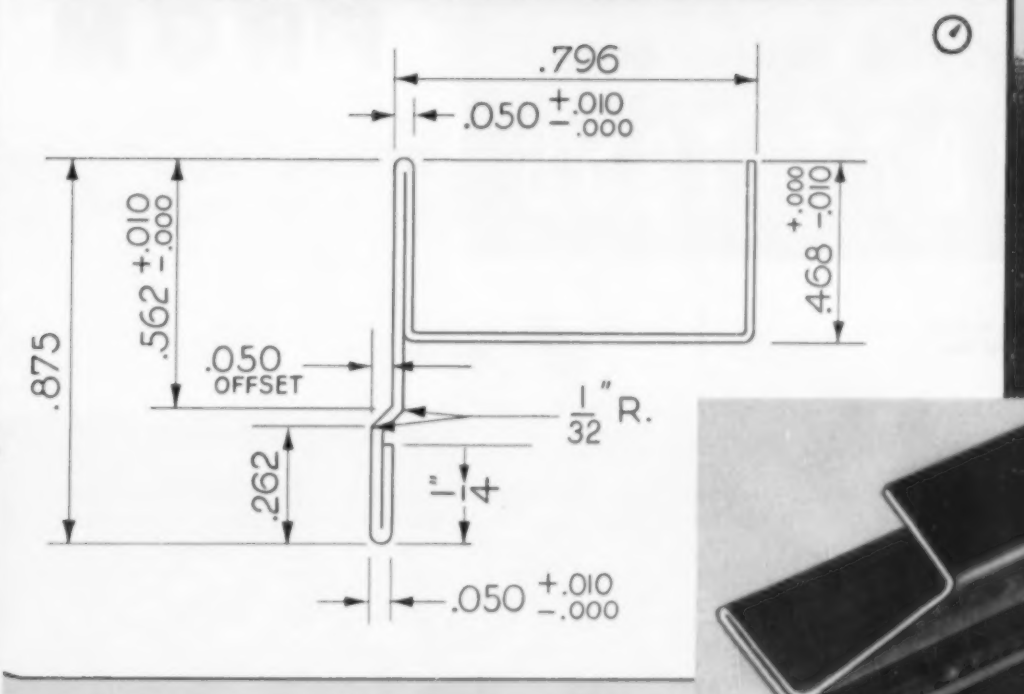
. . . at THE J. CLYTEL MANUFACTURING COMPANY

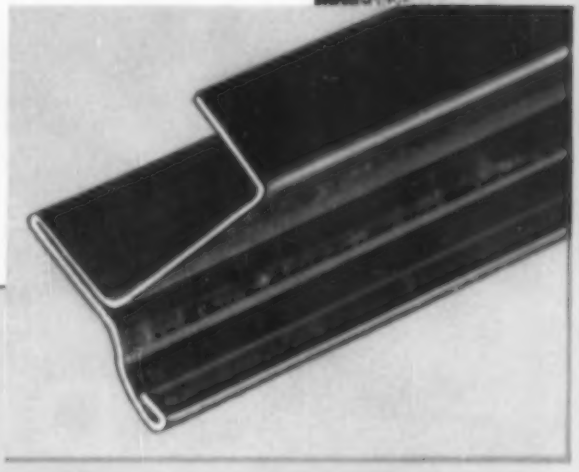
Metal Fabricators

CLEVELAND, OHIO

Photos courtesy the J. Clytel Manufacturing Company, Cleveland, Ohio.







These galvanized steel channels for sliding window frames must be formed straight and true, and all dimensions held to close tolerances.

The Clytel Company say: "Our press room feels that only Cincinnati makes Press Brakes."

Consult our engineering department on your forming problems.

Write for comprehensive Brake Catalogue B-4.

One of the efficient die set-ups used on this job

THE CINCINNATI SHAPER CO.

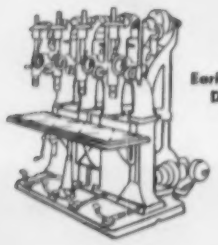
CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

CINCINNATI

W. F. & JOHN BARNES 1872-1956

FROM

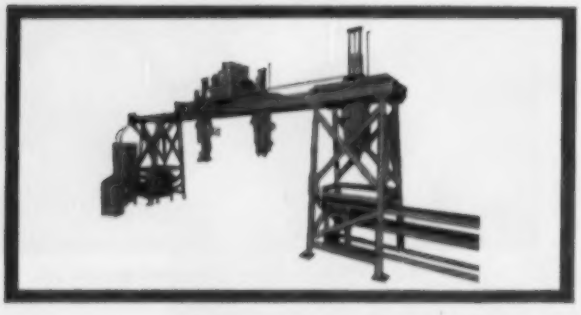
Foot Powered Scroll Saw

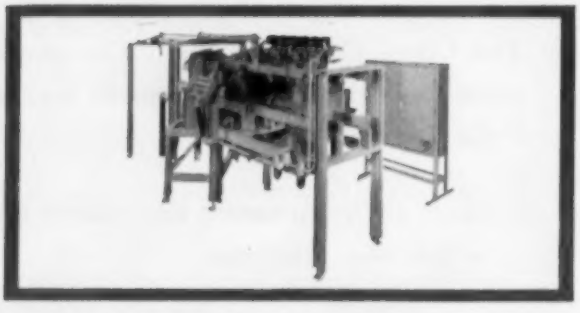


Early Gang Driller

● It was back in 1872 when the ox cart was still used for transporting goods and Edison was still experimenting with the electric light, that W. F. & John Barnes built their first industrial machine — a Foot Powered Scroll Saw. Later in the 1880's, the first Gang Drilling Machine was designed and built. This forerunner of the modern machine tools of today was shipped by ox team to a customer in a nearby town. Three days later, the records say, it arrived at its destination — a distance of 40 miles.

It is also a matter of record that all through these years, from oxen to jets, machines bearing the W. F. & John Barnes' name have been consistently associated with progressive developments and improvements in manufacturing methods. As a result, when you specify a Barnes' built machine today, you get a creative engineering and building service that is seasoned by experience — one that is complete and geared to serve your needs better than ever before.





▲ SPECIAL CONVEYORS — *typical of variety of units designed and built from standard components to increase material handling efficiency between machining operations. Engineered to meet individual job requirements.*

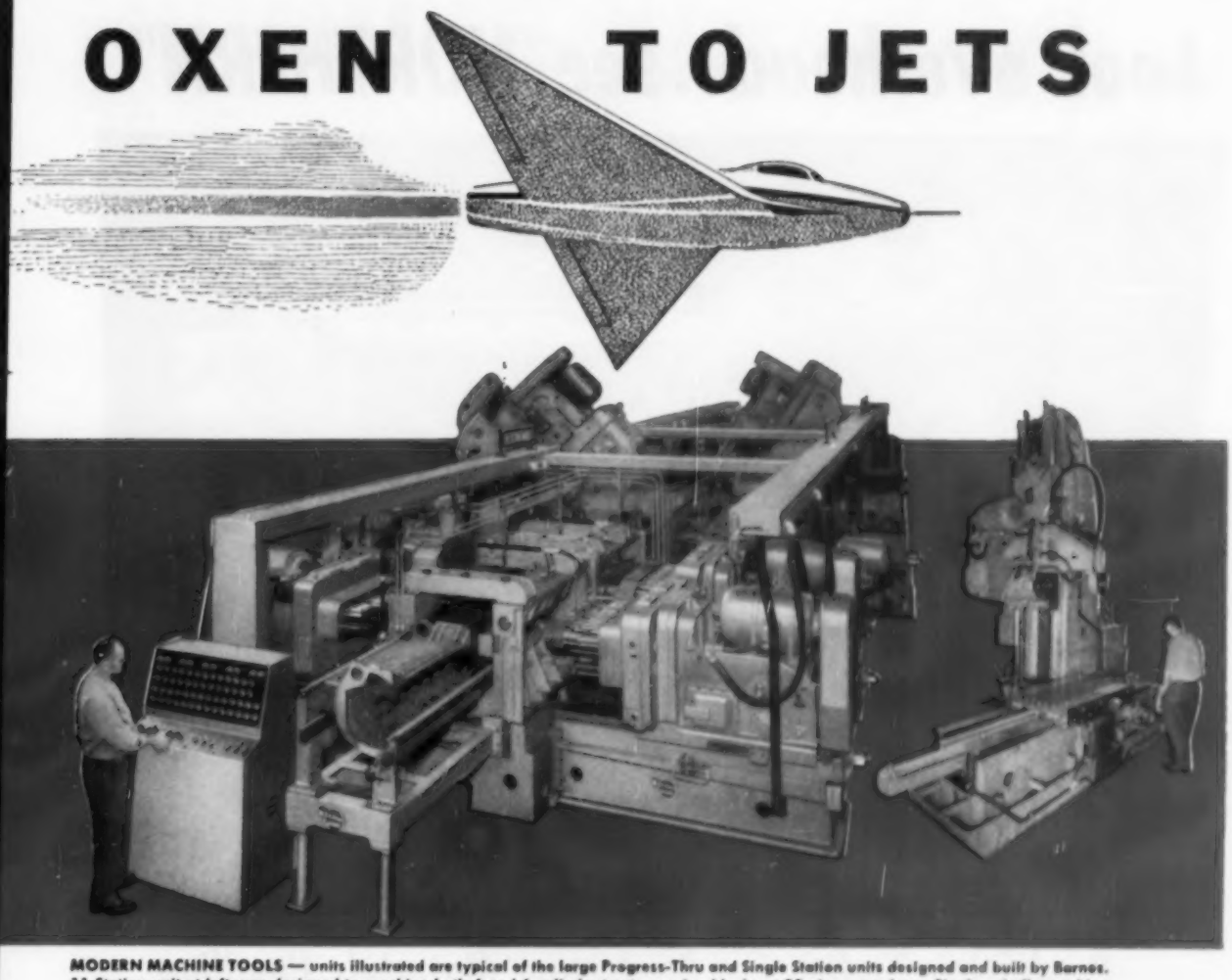
▲ SPECIAL AUTOMATION EQUIPMENT—*includes a range of turn mechanisms, (illustrated), special transfer and unloading equipment, inspection, and assembly machines, designed for automatic or semi-automatic production-line operations.*

W. F. & JOHN BARNES

BUILDERS OF BETTER MACHINES SINCE 1872

MULTIPLE SPINDLE DRILLING • BORING • TAPPING

OXEN TO JETS



MODERN MACHINE TOOLS — units illustrated are typical of the large Progress-Thru and Single Station units designed and built by Barnes. 11-Station unit at left was designed to machine both 4 and 6-cylinder tractor engine blocks at 25 pieces per hour. Single-spindle machine at right slab and face mills motor frame mounting pads at 6½ pieces per hour.

SPECIAL ELECTRICAL CONTROLS — a typical Barnes unitized control system of the sequence type. All are designed to assure the most dependable service and are built to best serve your specific needs.

ELECTRO-GRAPHIC DETECTOR SYSTEMS — a new, exclusive Barnes development. Cuts maintenance time on complex electrical controls up to 90%. Wired-in checking system pin-points malfunctioning elements.

Write **FOR FREE LITERATURE** — New 8-page brochure illustrates and describes Barnes' expanded facilities . . . outlines 6-Point Coordinated Machine Tool Designing and Building Service.

W. F. & JOHN BARNES COMPANY • 434 SOUTH WATER ST., ROCKFORD, ILLINOIS

MACHINES • AUTOMATIC PROGRESS - THRU AND TRANSFER TYPE MACHINES

Look overhead..see "NORTHERN"

Production Tooling for Production Materials Handling

Mechanized production processing — automation — with its hooking up of special purpose units, devices and controls designed to increase productivity — must be increasingly dependent on special purpose production tooling of all kinds—including overhead materials handling equipment.

NORTHERN OVERHEAD ELECTRIC TRAVELING CRANES—for wide spans—capacities up to 150 tons — when correctly custom-built for special purpose use — can quickly earn their cost in only a few years when they are fully integrated in your production planning.

Let us send you Technical Bulletin W-101.

NORTHERN CRANES—HOISTS—TRAVELATORS

NORTHERN ENGINEERING WORKS

210 CHENE ST. • DETROIT 7, MICH.

CALENDAR
OF MEETINGS

May 7-9, American Mining Congress: Coal convention, Netherland Plaza, Cincinnati. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president and secretary: Julian D. Conover.

May 7-11, American Welding Society: National spring technical meeting and welding show, Hotel Statler and Memorial Auditorium, Buffalo. Society's address: 33 W. 39th St., New York 18, N. Y. Secretary: J. G. Magrath.

May 9-11, Investment Casting Institute: Spring meeting and exhibit, New Yorker hotel, New York. Institute's address: 27 E. Monroe St., Chicago 3, Ill. Executive secretary: Harry P. Dolan.

May 9-11, American Management Association: Insurance conference, Hotel Roosevelt, New York. Association's address: 1515 Broadway, New York 36, N. Y. Vice president-secretary: James O. Rice.

May 10-11, Refractories Institute: Annual meeting, Grand hotel, Point Clear, Ala. Institute's address: 1801 First National Bank Bldg., Pittsburgh 22, Pa. Executive secretary: Avery C. Newton.

May 14-15, National Association of Sheet Metal Distributors: Spring meeting, Roosevelt hotel, Pittsburgh. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

May 14-16, National Industrial Service Association: Annual meeting and exhibit, Bellevue-Stratford hotel, Philadelphia. Association's address: 818 Olive St., St. Louis 1, Mo. Executive secretary: Fred Wipperman.

May 14-17, Design Engineering Show: Convention Hall, Philadelphia. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

May 16-18, Anti-Friction Bearing Manufacturers Association Inc.: Annual meeting, Princeton Inn, Princeton, N. J. Association's address: 60 E. 42nd St., New York 17, N. Y. Secretary: H. O. Smith.

May 16-18, Society for Experimental Stress Analysis: Spring meeting, William Penn hotel, Pittsburgh. Society's address: P. O. Box 168, Cambridge 39, Mass. Secretary: W. M. Murray.

May 17-18, National Industrial Conference Board Inc.: Annual meeting and general session for all associates, Waldorf-Astoria, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

May 17-18, Society for Advancement of Management: Material handling conference, Hotel Statler, New York. Society's address: 74 Fifth Ave., New York 11, N. Y. Executive vice president: Harold R. Bixler.

May 20-22, Building Research Institute: Annual meeting, Sheraton-Brock hotel, Niagara Falls, Ont. Institute's address: 2101 Constitution Ave., Washington 25, D. C.

May 20-23, Industrial Heating Equipment Association: Spring meeting, Homestead, Hot Springs, Va. Association's address: Association's Bldg., Washington, D. C. Executive vice president: Carl L. Ipsen.

May 20-23, National Association of Purchasing Agents: Annual convention and show, Hotel Cleveland, Cleveland. Association's address: 11 Park Place, New York 7, N. Y. Executive secretary-treasurer: G. A. Renard.

May 20-23, National Industrial Advertisers Association: Annual meeting, Palmer House, Chicago. Association's address: 271 Madison Ave., New York 16, N. Y. President: John C. Freeman.

May 20-24, Air Pollution Control Association: Annual meeting, Hotel Statler, Buffalo. Association's address: 4400 Fifth Ave., Pittsburgh 13, Pa. Executive secretary: Harry C. Ballman.

May 21-23, Triple Industrial Supply Convention: Traymore hotel and Chalfont Haddon Hall, Atlantic City, N. J. Information: W. B. Thomas, Hunter-Thomas Associates, 2130 Keith Bldg., Cleveland 15, O.

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NEW MACHINERY . . .
NEW PROCESSES
NEW FIRE HAZARDS
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"Automatic" SPRAY Sprinkler
At "Automatic" Sprinkler we've kept abreast of technological advancements and the effect of such progress in terms of fire safety for every business. In short, we either have the answer to your fire protection problem or our technicians will get it for you.
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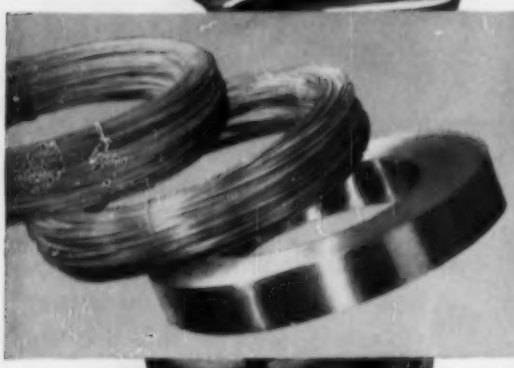

Follow Through IS IMPORTANT

From the time master craftsmen make the basic raw material in our own Steel Mill until Washburn Wire and Strip is ready for shipment to our customers, specifications for uniformity in all respects are rigidly followed . . . at various stages a percentage of each operation is examined microscopically.

It's this STRICT FOLLOW THROUGH that produces WASHBURN Steel . . . Top Quality Steel that gives your products the advantage of today's advancing standards. If Strip, rectangular, round and flat rods, tempered and untempered flat and round high carbon wires fit into your picture, write for information on any application you have in mind.

WASHBURN WIRE COMPANY, NEW YORK CITY

WASHBURN

CLEAN, UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

Four of six Ceco-Drops which replaced Board Hammers in a large automobile forge shop

·CECO-DROP·

The Ceco-Drop was selected because of better maintenance record and ease of operation

High production is maintained—there are no boards to change—fewer adjustments to make

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The Ceco-Drop is safer and easier to operate. "Leg fatigue" is eliminated. There are no overhead hazards

Parts shown here are typical Ceco-Drop forgings

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They are automobile shock absorber parts—pitman, anchor and arms

Have you the latest CECO-DROP bulletin? Write CHAMBERSBURG ENGINEERING COMPANY, Chambersburg, Pa.

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THE *HOTTEST* O.B.I.

without the spectacular facts

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BRAND NEW FROM THE GROUND UP

- Rugged, front-to-back crankshaft with huge crankpin
- Fully concealed, yet accessible, driving mechanism
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- Wider, box type slide all within gibbing
- Precision, hardened, longer-wearing gears
- Compact, straight-line, space-saving, all-steel frame

This is it! The most talked about press in the world! The press that captured the hearts of the entire industry at the Machine Tool Show! The press that was born to do more than any O.B.I. ever built!

Get the spectacular facts and figures on this metalworking marvel . . . the all-new Niagara Series E, Front-to-Back Crankshaft Inclinable. It outmodes everything within its range (75 to 200-ton capacities, 4 ½ to 7 ½ inch shaft diameters, standard and automated models).

PRESS IN HISTORY!

STUDDED WITH SCORES OF TECHNICAL IMPROVEMENTS

- No overhanging gears, flywheel and other mechanisms
- No damaging crankshaft deflection
- Full support to wide dies — no overhang on slide
- Greater resistance to off-center loading
- Accurate alignment of slide, with minimized tendency to cock
- Substantially increased die life
- Smoother, safer press performance — simpler, thriftier servicing
- Less floorspace required

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Please rush new Bulletin 56 with all the facts on your brand new Series E Inclinable.

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26 FACT-FILLED PAGES

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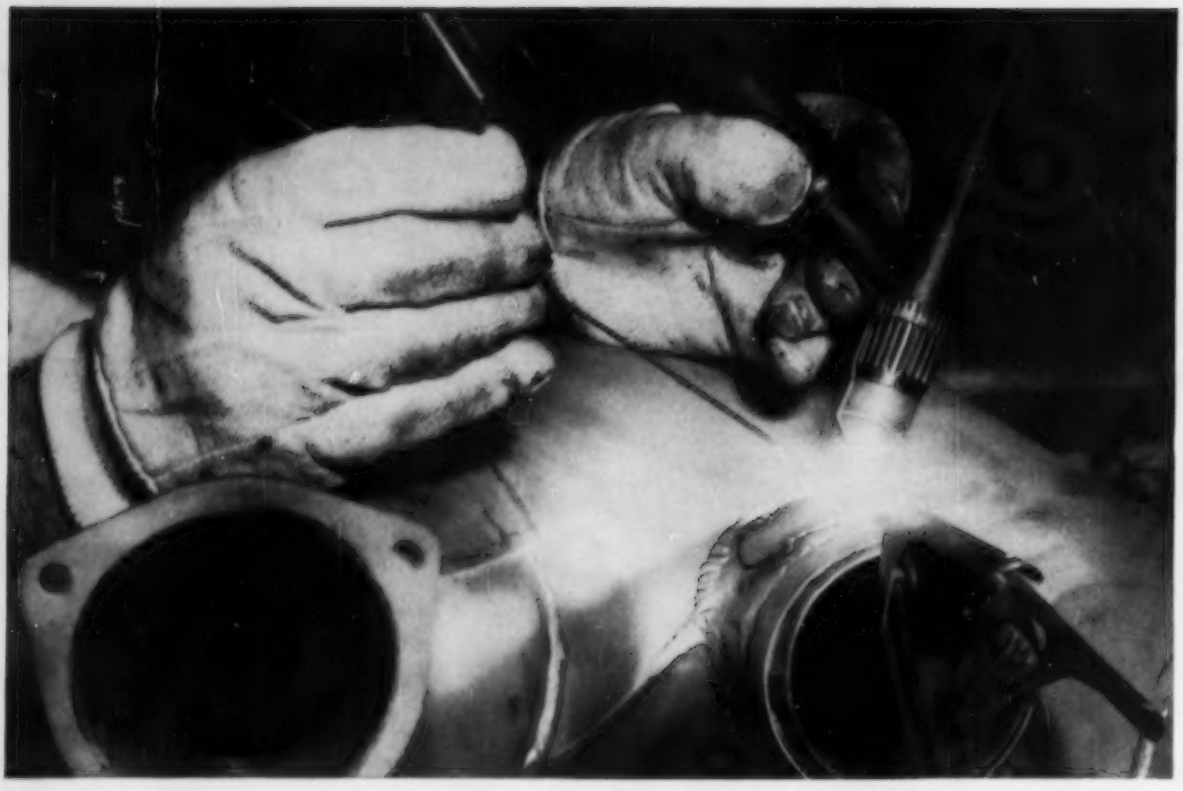
America's Most Complete Line of Presses, Shears, Press Brakes, Other Machines and Tools for Plate and Sheet Metal Work.



It took only 10 min. to repair this aircraft manifold by HELIARC welding—the savings amounted to $1,485 over the price of a new manifold.

"HELIARC" WELDING SAVES 99%

Of New Part Cost . . .

Throughout industry, HELIARC welding is being used to make repair welds in all types of commercially fabricated metals—at a fraction of new part cost. In the repair operation shown here, a ⅛-in. thick stainless steel aircraft engine exhaust manifold was HELIARC welded and made good as new for $15 . . . the cost for a new manifold would have been $1,500.

Whether used for fabricating or repairing, HELIARC welding is ideal for joining light gage metals. Welding can be done in all positions on all types of joints—with portable manual, and semi-automatic equipment. Mechanized setups are also available.

In HELIARC welding there is no slag, spatter, or smoke. The weld area is argon-gas-shielded from the harmful effects of the atmosphere, and the operator can see and control the weld puddle at all times.

HELIARC welding may be the answer to *your* fabricating and repair problems. Find out—call or write your local LINDE Representative today.

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First with NEW "Automatic" Service

Cone was the first builder of multiple spindle automatics to provide machine users with an experimental service in the application of carbide tools.

This service is a practical means of determining the possibilities of carbide tools for production men without loss or interference with their regular production schedules.

A pamphlet "FOUR STEPS WITH CONE" describes this service. Send for your free copy.

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.

MUELLER BRASS CO.
improves LENSOMETER
lower cost

FORGED PART APPROXIMATELY ½ SIZE

Precision and extreme accuracy are vitally important functions of the Lensometer, manufactured by the Instrument Division of the American Optical Company, Buffalo, N. Y. The Lensometer is used to determine the focal strength and axis of an optical lens and, consequently, must be extremely precise in operation to provide accuracy and uniformity in lens prescriptions.

Forgings made by the Mueller Brass Co. play an important role in the construction of the Lensometer and contribute to its outstanding performance. Formerly, the body of the Lensometer was produced from *three* sand castings, but these now have been replaced by just *two* forgings. Naturally, this simplifies assembly, and the big forged bronze main support arm, shown above, along with the lens support bracket insures the constantly accurate alignment of the instrument. During the first year when forgings were used instead of castings, American Optical not only recovered the initial tooling costs but also realized considerable savings on each Lensometer produced. This is another good example of the way Mueller Brass Co. forgings can benefit a product two ways . . . better performance and lower costs. Chances are, your product can likewise be improved at a savings to you if you specify brass, bronze or aluminum forgings made by the Mueller Brass Co.

FORGING

at substantially

• WRITE TODAY FOR THE ENGINEERING MANUAL YOU NEED

Mueller Brass Co. Forgings Engineering Manual H-58565 ☐

Tuf-Stuf Aluminum Bronze Alloys Engineering Manual H-58563 ☐

600 Series Bearing Alloys Engineering Manual FM-3000 ☐

Copper Base Alloys in Rod Form Engineering Manual FM-3010 ☐

METALS AND ALLOYS REVIEW

by FRANK M. LEVY

Vice-President and Director of Research

One of our most interesting series of alloys is the group which we market under the tradename "Tuf-Stuf" . . . a group of aluminum bronze alloys with range and flexibility to meet the most demanding needs. They are high copper base alloys containing from 9% to 13% aluminum and varying amounts of iron, nickel and manganese. Being free of zinc, they are not subject to dezincification. Tuf-Stuf alloys have a low coefficient of friction, good wearing qualities, high tensile strength, high hardness and the ability to withstand heavy pounding. Some of the alloys can be hardened by heat treatment. In the harder grades, these alloys are used for heavy duty service where high compressive loads are encountered and where lubrication may be scant. Present day increases in operating speed of modern machine equipment and the economy of little or no machine "down" time has made Tuf-Stuf popular in the machine tool industry. It is used in a multitude of applications where resistance to wear is important, such as: Drill Jigs, Feed Nuts, Rollers, Cams, Collets, Gibs, Gears, Boring Bar Guides, Lead Screw Nuts and Clutch Shifter Forks. Also, because of their ability to withstand higher stresses and resist season-cracking, these alloys are ideally suited for threaded nuts and bolts and pole-line hardware.

The unusual physical properties of the Tuf-Stuf series have made it particularly useful in the chemical and allied industries. These alloys combine the strength and ductility of medium steel with high resistance to corrosion by many chemicals. Tuf-Stuf alloys will not only resist oxidation at elevated temperatures, but will also retain a greater portion of their strength and hardness at these temperatures than will the copper zinc alloys. These properties make them ideal in the aircraft industry for valve seat inserts, spark plug bushings, valve guides and propeller hub cones.

Tuf-Stuf alloys are supplied as forgings, rod or screw machine products. As forgings the grain structure can be controlled to produce parts that are strongest at points of greatest stress and strain. Relatively intricate shapes can be forged to closer tolerances than sand castings. Where appearance is a factor, a forging may easily prove more economical since a minimum amount of machining, buffing or polishing is required before finishing.

If you'd like more information about this series of alloys, drop me a line or better yet, send me your sample part or blueprint and an explanation of its use and we'll be glad to submit our recommendations.

MUELLER BRASS CO.

PORT HURON 19, MICHIGAN

178

Greater Magnetic Attraction . . .
More Efficient Design

Delpark

Gravity Type
High Capacity
Low Velocity Flow

Magnetic Separator

A new, more efficient design with gravity flow over an enormous, fully concentrated flat magnetic field to give the greatest, most efficient separation of ferrous sludge and abrasives from liquid.

- Greatest concentration of Alnico #5 Permanent Magnets.
- Most powerful magnetic field.
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- Constant sludge removal by chain driven flights.
- Self Cleaning — Fully Automatic.

Delpark Magnetic Separators are available with adjustable legs, with dragout in tank, with collector tank or without tank. They are also used in combination with the famous Delpark Disposable media filter.

Delpark . . . first in filtration advancements

Write for more complete information

INDUSTRIAL FILTRATION COMPANY
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What Design Engineers Say About PHILLIPS CROSS RECESSED HEAD SCREWS

TITAN THERM-O-DIAL HEATER (Buffalo, N. Y.) is in a highly competitive market where appearance is important. Designer says, "We get a much tighter metal-to-metal bond, yet utilize a full mass-production assembly, which we could only do with Phillips screws."

"A BETTER LOOKING FIXTURE is obtained by the use of Phillips cross-recessed-head screws on our 8-Tone chime," says the chime engineer of Nutone Incorporated of Cincinnati, Ohio. "If screws must be used on the exterior of any unit, I definitely feel Phillips recessed-head screws are the very best choice."

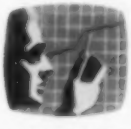
PUSH-BUTTON STATION by Clark Controller Company, (Cleveland) must indeed be bright as a button and unmarred. Says design head, "We selected Phillips screws because they permit easy assembly with driver slippage reduced to a minimum."

MANUFACTURERS OF PHILLIPS CROSS-RECESSED-HEAD SCREWS

THE FASTENERS OF TODAY...
AND OF THE FUTURE
X *marks the spot*
the mark of extra quality

Pledged to highest standards...

The Phillips Screw manufacturers listed here cooperate to turn out a uniformly high standard of quality. As sponsors of the Phillips Cross-Recessed-Head Standards Committee they adhere to the established dimensional standards, gauges, and gauging methods which will best serve industry.



Members of Screw Research Association

American Screw Company • Atlantic Screw Works, Inc. • The Blake & Johnson Co. • Central Screw Company • Continental Screw Co. Elco Tool and Screw Corporation • Great Lakes Screw Corp. • The H. M. Harper Company • The Lamson & Sessions Company • National Lock Company • The National Screw & Manufacturing Company • Parker-Kalon Division, General American Transportation Corporation Pheoll Manufacturing Co. • Scovill Manufacturing Company • Shakeproof Division Illinois Tool Works • The Southington Hdwe. Mfg. Company • Sterling Bolt Company • Wales-Beech Corporation

JOHN BUTLER TYTUS *dreamed that steel could be rolled in a continuous strip. In 1904, fresh from Yale University, he went to work as a laborer in the rolling mill to learn the craft, rose to mill superintendent and worked out the techniques and blueprints of his continuous rolling mill during World War I. It took him until December, 1923, to build the first mill and another six months of trial operation to produce satisfactory sheets. Today, billions of dollars worth of smooth-finished, deep drawing sheets roll at ever-increasing speeds from the continuous mills of America.*

Great Names in Steel Making #I

To the public, beneficiary of the high quality and lower cost of continuous rolled steel in a thousand products, John Butler Tytus is virtually unknown. But within the steel industry, his is one of the great names.

There are other names — names of men and of products — similarly unknown to the public but of important significance to steel men. The name "Palmoshield" is an example.

It is four years since Fortune magazine carried the first report of Palmoshield: "New All-American Lubricant Frees Rolling Mills from Hazards of Foreign Supply." The time was March, 1952, midway in the Korean War, and before that year was out, millions of pounds of Palmoshield had displaced imported palm oil for tin plate rolling in American and Canadian mills. Its use invariably proved so satisfactory that this volume has since doubled and tripled. Not only has Palmoshield made its place in tin plate rolling but in sheet rolling, long terne and coating lines as well. Today, on its fourth anniversary, "Palmoshield" has won an honored place in the dictionary of steel.

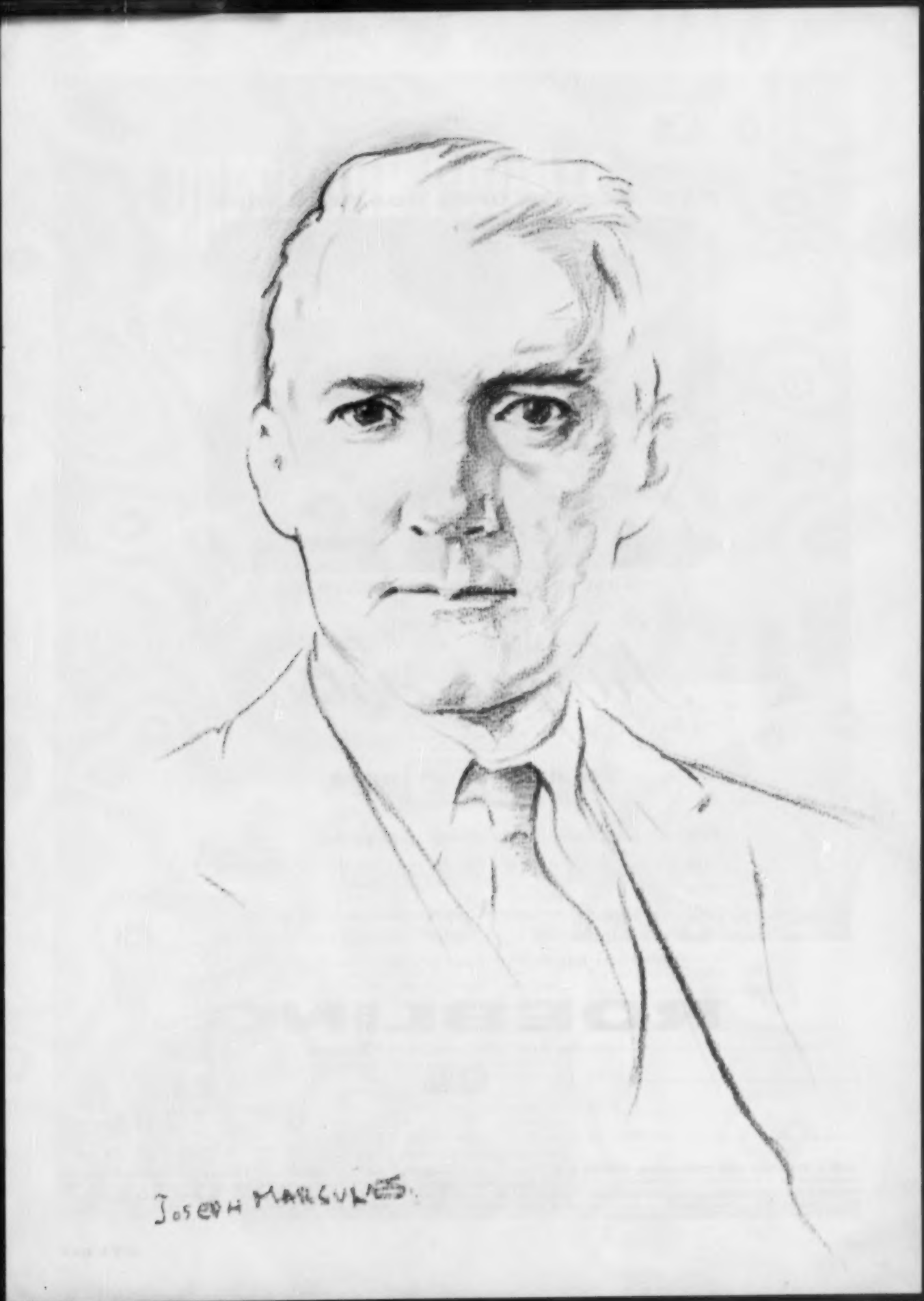
Names of other Ironsides "Shield" lubricants have been highly regarded in the steel plants for many years. Ironsides "roll neck shield," formulated for continuous application by automatic pressure, is known as the lubricant that keeps roll necks at constant temperature. Ironsides "roller bearing shield," an extreme pressure lubricant noted for high load-carrying capacity, is approved by leading makers of bearings.

Just as special problems had to be overcome before mills could roll steel in a continuous strip, almost every plant has lubrication problems special to its operation. Ironsides engineers are "custom tailors" of lubrication who welcome such opportunities to be helpful. Direct your letter or telephone call to The Ironsides Company, Columbus 16, Ohio.

Ironsides

SHIELD PRODUCTS

By the makers of Palmoshield
"the palm tree that grows in Ohio"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THEN WE MADE ROEBLING'S

Royal Blue

WIRE 1105 ROPE

1105 takes Royal Blue out of the ordinary wire rope class.

1105 is a rope wire that's new—that's stronger. It's the biggest news in many years.

1105 is the result of more than a century of research and development—it's the wire that gives Roebling Royal Blue the stamina that pays off in service.

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You Can Count

BULLARD

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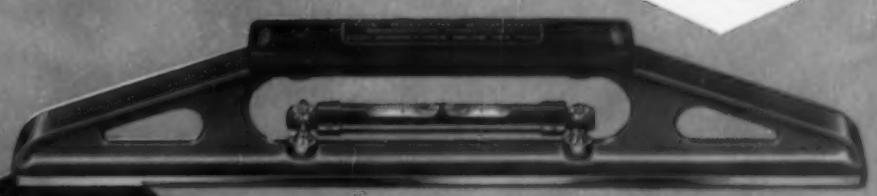
Precision Aligning Level

Today's high standards of machining accuracy make it imperative that the machine is maintained level at all times. Among the innumerable factors that work against this condition are constant vibration, settling of buildings and floors and the molecular changes of cast iron and steel. Increase the life of machines — lower maintenance cost — by using a Bullard Precision Aligning Level.

AVAILABLE IN 12", 18" AND 27" SIZES



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1. The vial used is made of the best optical glass, specially ground, and is filled and guaranteed by one of the greatest Level Makers in the world.

2. The vial is mounted on two brass studs, which permit adjustments in the same manner as the Level Vials on the finest surveying instruments.

3. The Bubble in the Vial has a guaranteed sensitiveness of 5 seconds of arc per graduation. This is equivalent to showing per graduation on Vial a variation of .0003 of an inch per foot.

4. The Level Casting is thoroughly insulated from the palm of the hand by means of a handle of special non-conductive material.

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6. This Precision Instrument is safely protected in a felt lined box.

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CF&I

LECTRO-CLAD* Trademark

Nickel Plated Steel Plates will give it to you

Yes, you can get low-cost, yet effective protection against contamination and corrosion with all these chemicals...and many more!

Effective in heavy industrial applications where the corrosion rate does not exceed 0.0015 inches per year, CF&I LECTRO-CLAD Nickel Plated Steel Plates successfully combine the corrosion and contamination resistance of nickel and the economy and strength of carbon steel.

That's because CF&I LECTRO-CLAD is made by the Bart Process, which consists of electrodepositing a heavy layer of 99% pure nickel on a carbon steel plate. This process results in a permanent bond between the nickel and the steel base. The nickel plating is customarily supplied in the 8-10 mil range; however, it can be plated up to 15-20 mils, if specified.

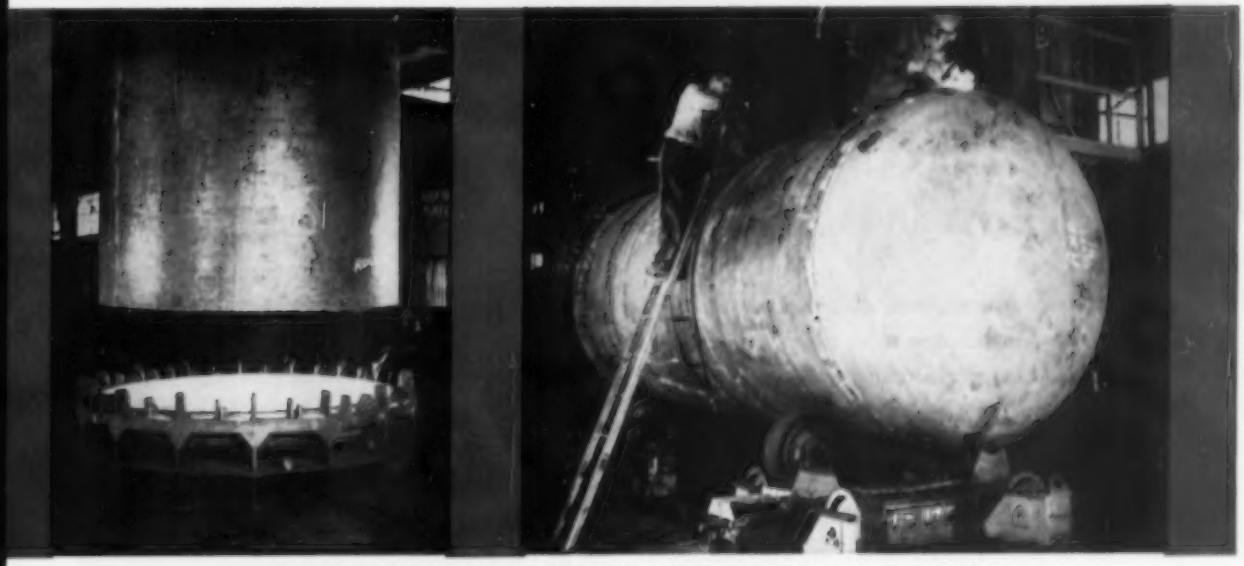
What's more, CF&I LECTRO-CLAD Nickel Plated Steel Plates are easily fabricated without costly special equipment. Just use regular shop equipment and bend it... weld it... roll it—the protective nickel layer will not check, spall or flake!

Ask our nearest sales office for the complete story on economical, effective, easy-to-fabricate CF&I LECTRO-CLAD Nickel Plated Steel Plate today. Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation, P. O. Box 1951, Wilmington, Delaware.

* Electroplated by the Bart Process

protection against with these chemicals?

Caustic Soda • Chlorinated Hydrocarbons • Cold Hydrofluoric Acid • Dibutyl Phthalate
Methyl Alcohol • Petroleum Catalysts • Phenol • Potash • Resin Plasticizers • Salt
Sodium Sulphate • Titanium Dioxide • Tricresyl Phosphate



Assembling a tank fabricated from CF&I LECTRO-CLAD Nickel Plated Steel Plates.

3798

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are your answer for...

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- Jogging or Creep Speeds
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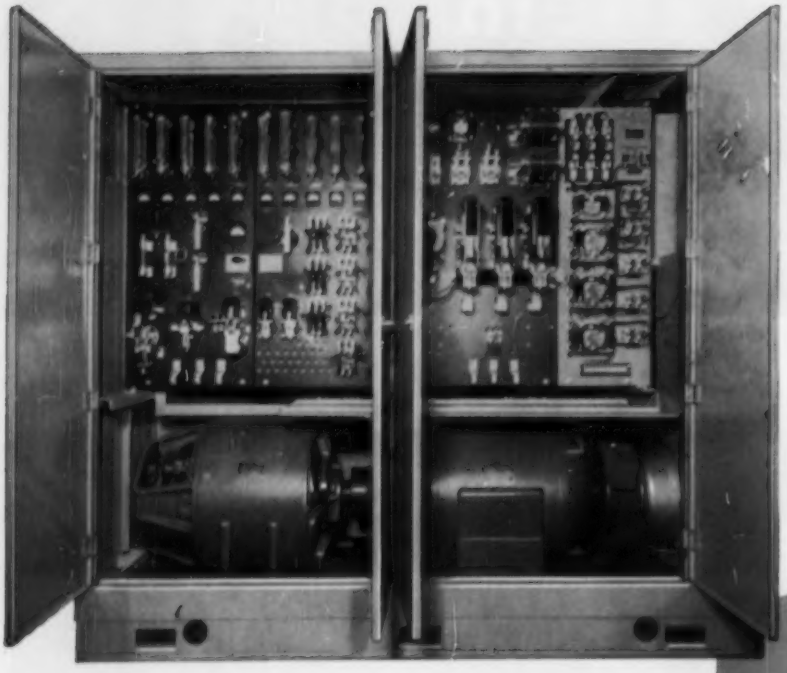
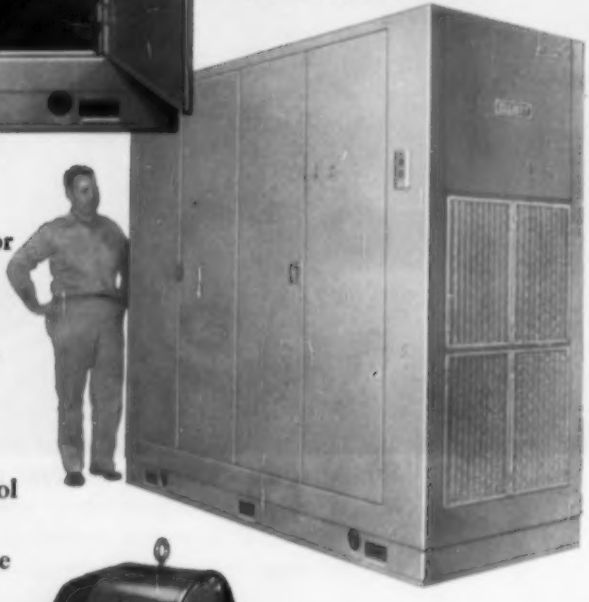
- Visual Speed Indication
- and many other complex operating conditions



A control cabinet houses the a-c to d-c conversion unit, plus the control required for the particular application. At left is a 100-hp package.

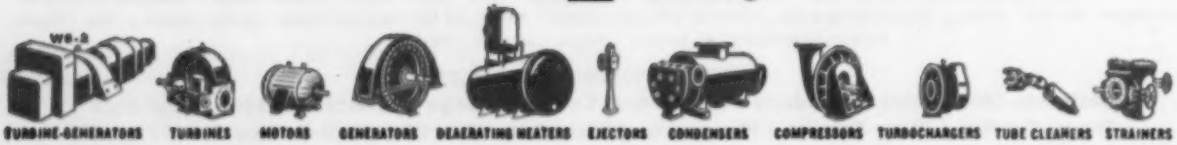
Power unit is housed in a pressurized sheet-metal cabinet with incoming air passing through filters, insuring long life and low maintenance costs. Cabinet has doors, front and rear, for easy access; doors, as well as center posts, are removable.



THESE PRE-ASSEMBLED, PRE-WIRED, easily installed power packages meet today's needs for flexible d-c motor performance from a-c power supply. They are designed for ratings up to 200 hp; speed ranges to 16:1 and up; 208, 220, 440 or 550 volts; 25, 50 or 60 cycles; 2 or 3 phase operation. Many modifications can be provided to meet special operating conditions. All components—power conversion and control—are backed by the Elliott Company's more than half-century experience in the manufacture and application of industrial drives. For complete information, write Elliott Company, Crocker-Wheeler Division, Jeannette, Pa.

A typical Elliott C-W d-c motor for use with adjustable speed drives. In addition to dripproof (shown) Elliott offers totally-enclosed, integral brakemotors and gearmotors.

ELLIOTT Company



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National Standard has patents pending on equipment for this certain operation.

Check your AIM*. . . National-Standard did

Steel strapping idea cuts two big costs

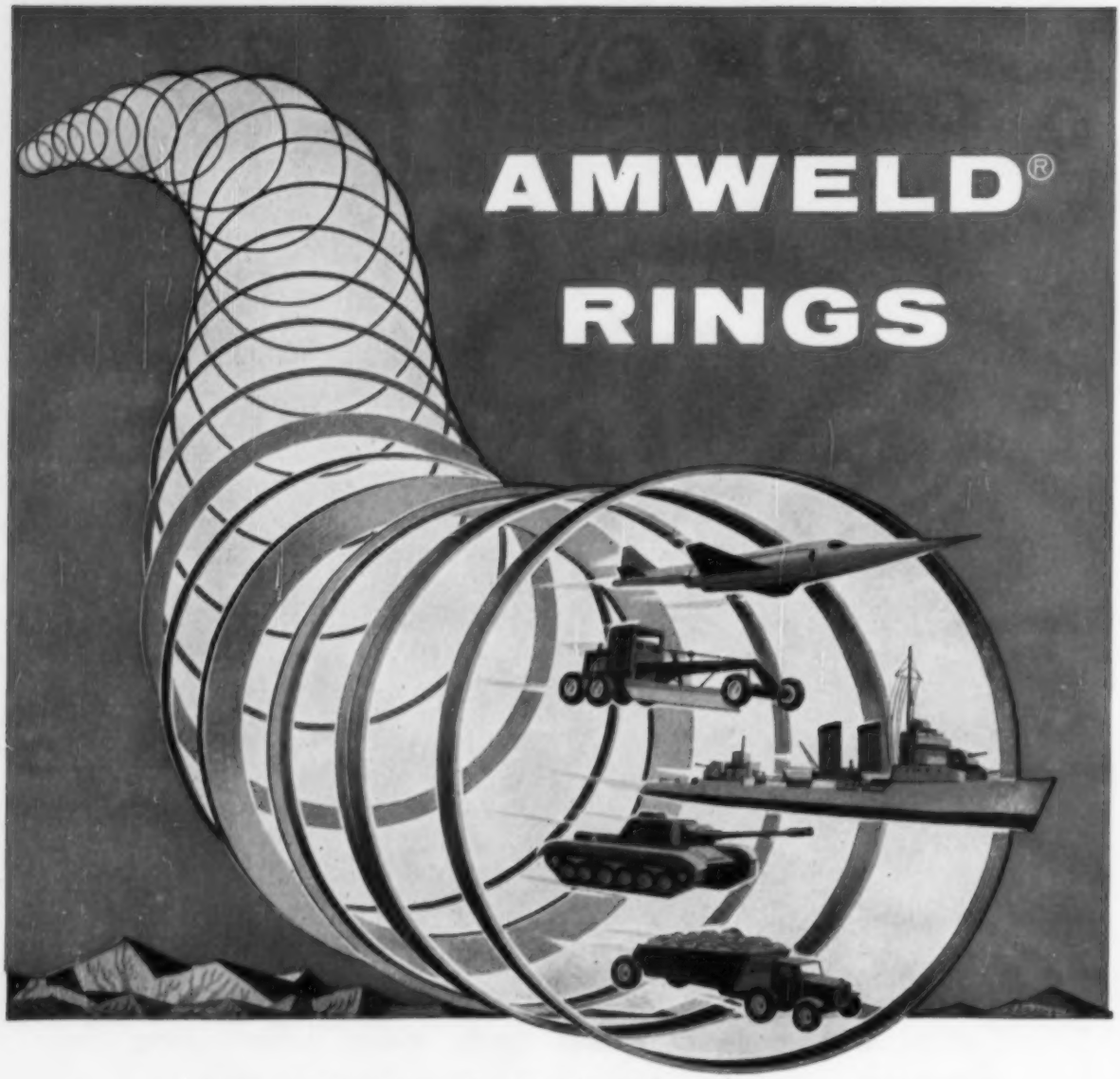
NATIONAL-STANDARD COMPANY of Niles, Michigan, with an important assist from Acme Steel, has cut *shipping* and *handling* costs for its customers in the packaging of tire bead wire.

This wire formerly was shipped on returnable steel reels, for which the customer was charged—then credited when reel was returned. Wire is now wound on a fibre core placed on a collapsible reel. Acme Steel Strapping is applied, reel is dismantled, and coil of wire is ready for wrapping and palletizing. Reel charges are abolished, freight costs to customers are cut, and palletizing with steel strapping is simplifying handling and storage problems.

***Check YOUR Acme Idea Man.** He will work with you—give you Acme Steel Strapping ideas to help you with your packaging and shipping problems. Call him at the nearest Acme Steel offices, or write Acme Steel Company, 2840 Archer Avenue, Chicago 8, Illinois.

ACME STEEL STRAPPING

ACME STEEL



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AMERICAN WELDING

Third Best Year in Autos?

"Even the attainment of a 'second best year' for the auto industry in 1956 now seems an elusive goal," says *Value Line Investment Survey*. It's pessimistic about chances this year because of continuing high dealer stocks and "disquieting" sales performances in April. To date, the second best year was 1950, when 6.7 million cars were built; 7.9 million were produced in 1955. Trucks continue to be the bright spot in the automotive picture. In the first quarter, 311,746 were built, 18 per cent more than in last year's first quarter.

Home-Owning Americans

More Americans own their own homes and are in the market for housing products. The Census Bureau says 60 per cent of the nation's householders own their own homes now, compared with 55 per cent in 1950. Home ownership is highest (66.4 per cent) in the North Central states—Ohio, Michigan, Indiana, Illinois, Missouri, Kansas, Nebraska, Iowa, Wisconsin, Minnesota, and North and South Dakota.

$6 Billion in Air Conditioning

Retail sales volume of air conditioning equipment will hit $3 billion in 1956. It will exceed $6 billion by 1966, predicts John E. Haines, vice president of Minneapolis-Honeywell Regulator Co. He bases his optimism on possibilities for air conditioning industrial plants. Less than 1 per cent of all U.S. factories are so equipped today.

Patent Proposals

Sen. Joseph C. O'Mahoney (Dem., Wyo.) has introduced a bill "designed to speed up the processing of applications for patents and limit the period of life of a patent to a maximum of 20 years from the date of application, or 17 years from the date of issuance, whichever is shorter." The bill is aimed at eliminating stalling tactics by some applicants trying to prolong the patent life beyond 17 years. Another bill by the senator would establish a single court for patent appeals. The Patent Office itself will kick off an eight-year program to reduce patent application backlogs—provided it gets the funds. Aim is to be able to act on an application in three to four months instead of the present year or longer it often takes.

Expanding Gas

Soaring sales of gas-fired appliances—heating equipment, water heaters and clothes dryers, particularly—will give the natural gas industry more than $900 million a year in added revenue by 1960. So forecasts W. F. Rockwell Jr., president of the Gas Appliance Manufacturers Association. Gas ranges, while not reaching record levels, will sell in greater quantities than last year, he predicts. One example of the kind of sales gains being experienced in the growth equipment: Shipments in the first quar-

ter for warm air furnaces hit 168,000, up 11 per cent from the same 1955 quarter, which itself was a record-breaking period.

Growth in Pipelines

More than 17,000 miles of new pipelines are scheduled to be added to this country's system in 1956, says Arthur S. Flemming, defense mobilizer. That total might have been larger had the Office of Defense Mobilization not nixed private industry proposals for a pipeline to carry 335,000 barrels of Gulf Coast oil a day to the Ohio-Pittsburgh area. The scheme would have involved financial participation by the government.

Troubles for WOCs

WOCs remain a subject of argument. The House has tacked an amendment onto the bill that would extend the Defense Production Act for two years. It requires industry people who sign up for the Executive Reserve to file a statement of financial interests. If that amendment were to stay in the DPA extension, it would kill off the Executive Reserve plan, some observers believe. The amendment's only purpose, they say, would be to harass potential reservists.

How To Package Valves

Thompson Products Inc. is improving packaging productivity in its Valve Division 12 per cent a year. Some samples of what Thompson has done: Packaged valves in hole boards standardized to six different types; extended one layer of valve stems upward and the next downward to package twice as many valves in one container; palletized cartons on four-way entry expendable pallets, to facilitate handling in the receiving and inspection areas; packed parts not required to be free of nicks and scratches in bulk containers.

GE Notes

General Electric Co. predicts its sales will reach a record $3.9 billion in 1956, 15 per cent more than in 1955 . . . From the end of World War II to the end of 1955, GE had spent $1.2 billion on expansion and improvement . . . GE's Electronics Division will make ERMA electronic computers for the Bank of America's long-range multimillion-dollar computer program.

Straws in the Wind

Chrysler Corp., which has just completed a medium tank contract at Newark, Del., will convert the plant to begin production of Plymouths early in 1957 . . . Philco Corp. will enter the laundry equipment field May 15 with automatic clothes washers, electric and gas clothes dryers and wringer washers . . . Despite the strike at 40 of its plants during all but ten days of the first quarter, Westinghouse Electric Corp. shipped $225.4 million worth of products.

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a steel tube or bar for every purpose

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Whatever your tubing requirement—whatever kind and quantity you need—you can get quick delivery of a quality product with a single call to Ryerson.

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To help you select the best cold finished bar for each application, we have just published a simplified guide showing the comparative strength, cost, machinability, workability, etc. of all commonly used types. Write for your copy and call Ryerson when you need high quality cold finished bars.

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SCORE – 99.956%
on appliance hardware components for 14 consecutive months January '55 through February '56

We have the customer's permission to cite this actual experience—

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This DSC customer makes a quality line of appliance hardware components. His gauges run from about .040 inch to about 5/32 inch (some with restricted tolerance) . . . in various widths . . . tempers 1, 2, 3 and 4. We supply DSC No. 2 regular bright finish for chrome plating.

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Of the total tonnage of DSC STRIP shipped to this customer during the period stated, 99.956% met all requirements. Rejections for all reasons—gauge, size, temper, finish, etc.—averaged less than 43½ pounds per 100,000 pounds.

On the same basis, the overall performance of DSC STRIP on total shipments to all customers during 1955 averaged 99.354%.

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PMI

Adv. Courtesy DSC

Let's Make Steel!

Eight weeks from today most of the steel industry's furnaces may be cold. The movement of steel to consumers may be slowed to a trickle.

David J. McDonald's United Steelworkers of America has told 172 steel producers and iron ore mining companies that it wants a new contract replacing the one expiring June 30.

In turn, the steel industry has notified USW that it will terminate its present labor contract on the same date. In conforming with Taft-Hartley provisions, the industry can legally present a united front should the USW decide to pressure one or two companies at a time with selective strikes.

The USW's powerful 170-man wage-policy committee will not meet until May 14-15 to formulate its demands, but they are well known:

1. A big wage increase. Cost: It could be 15 cents, certainly not less than the 6 cents auto workers are getting this year.
2. Week-end premium pay with time and a half for Saturday, double time for Sunday and the ultimate goal, a shorter work week.

   McDonald says this is the "breakthrough" year. Steelworkers have no desire to put a penalty on the company to make more money on week ends, he says. The steelworker wants to spend more time with his family. Cost: Applied to continuous operations, it could be as much as 55 cents an hour.
3. Supplementary Unemployment Benefits. The union says demands will follow the pattern of the American and Continental Can agreements: Take-home pay equivalent to 65 per cent of earnings for 52 weeks. Cost: 5 cents an hour.
4. Insurance and pensions. To get provisions on these expiring at the same time (insurance expires Oct. 31, 1956, and pensions one year later) both may be bargaining issues.

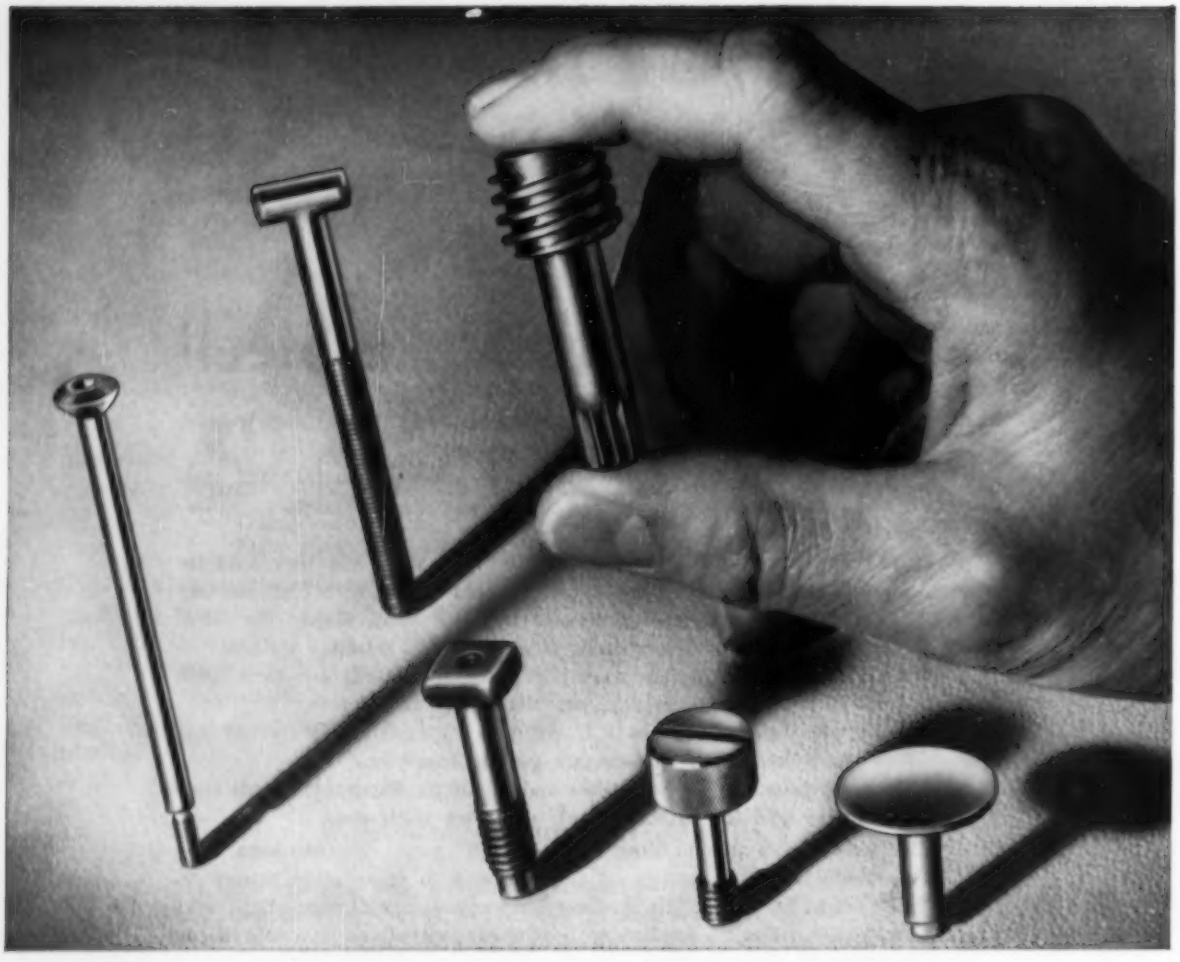
The steel industry's employment costs ($2.722 an hour) have tripled since prewar, almost doubled since the end of the war. Last year they went up 21 cents. Straight wage increases and social benefits can be passed along in the form of higher prices with relatively little pain. The demand for week-end pay in an industry that must operate many of its departments around the clock is unreasonable. Continuity of employment is a commendable goal but difficult for an industry whose operations must fluctuate with the ups and downs of the industries it sells to.

A strike on June 30 would have only the momentary beneficial effect of shaking out excess inventories of certain products. It would put a huge dent in the nation's expansion program. It would cost 519,000 steelworkers $56 million a week in never-to-be-regained earnings.

Nobody wins a strike. Let's make steel!

Irwin H. Such

EDITOR-IN-CHIEF



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Extra Hands for Engineers

Technicians can help relieve the engineering shortage by doing less demanding chores. Here are tips on how to find, train and use them

Jobs Engineers Would Delegate to Technicians

(based on a survey by Radio Corp. of America)

	% of engineers doing this work	% of engineers doing this work who think a major part could be delegated	
		To Clerical	To Technician
Report writing	77	2	2
Correspondence	74	8	
Consultation with mfg.	73		
Technical meetings	72		
Engineering testing	68	2	34
Library research	62	4	4
Instructing others	61	1	1
Factory follow-up	57	6	19
Development shop follow-up	57	12	34
Expediting	56	39	30
General information meetings	56		
Drafting	53	3	83
Making graphs	47	4	75
Vendor contracts	41	2	4
Equipment and tube building	39		47
Customer contacts	25		3
Training meetings	25		
General errands	24	55	34
Ordering supplies	24	41	17
Routine testing	22	4	96
Handling personnel matters	19	4	
Handling purchase requisitions	18	41	18
Interviewing job applicants	18	4	
Writing instruction books	10		17

WHEN SOLAR Aircraft Co. wanted to set up a metallurgical lab in Des Moines, Iowa, it had to cope with the general shortage of engineers and their unusual scarcity in Iowa.

Hiram Brown, company chief metallurgist, describes Solar's solution: "We hired young people with technical interests and high school math and science subjects to be technicians. Today, we are making out well with 9 graduate engineers and 54 techniciana."

Definition — "Technicians can help solve the shortage of engineers," says Leon DeMause, administrative engineer for GM's Cadillac Motor Car Division. Such assistants usually have some engineering training and education, but no college degree.

Radio Corp. of America surveyed its engineers at Lancaster, Pa., and discovered they thought that 13 per cent of their time in a typical week was spent on chores which could be delegated to technicians. Another 6 per cent of their time, they believed, was spent on clerical details which could be delegated. RCA deduced that if work were delegated to technicians and clerical workers, 99 engineers could perform functions now requiring 122 engineers. Even if those estimates proved 50 per cent overoptimistic, a saving of 10 or 11 engineers would still be possible.

Example—The table at left (resulting from RCA's survey) can help you in spotting activities contributing to the inefficient use of engineering time. Note particularly:

1. Some 24 per cent spend time ordering supplies. Over half feel that their part in that activity could be done by lesser skilled people.

2. Twenty-two per cent say they do routine testing. They agree unanimously that it could be done by technicians or clerical-administrative employees.

3. Some 57 per cent perform factory follow-up activities and 57 per cent do development shop follow-up. Many feel that much of this work could be delegated.

4. About 53 per cent are called

on to do drafting. Of this group, 86 per cent think the activity could be delegated.

The Need—Cadillac's DeMause believes companies that could make additional use of technicians are those smaller firms which have gone to great and expensive lengths to hire nothing but graduate engineers to man their engineering departments. Many of them could probably get along well with a ratio of not less than two technicians for each engineer.

Today at Cadillac there are 3.5 technicians to every engineer. Solar's ratio in Des Moines is 6 to 1. Westinghouse Electric Corp.'s Air Arm Division believes in a 2-to-1 ratio. American Bridge Division of U. S. Steel says that 62 per cent of its 1500-man engineering organization are technicians. Thompson Products Inc. has three technicians for every engineer, a ratio that has stayed about the same for ten years, although Thompson hires many more technicians now than in 1946 because it employs more engineers. Some 108 engineers staffed one Thompson division a decade ago; 280 are needed for the job now. Of course, ratios must vary with circumstances. Engineers' Council for Professional Development says the average requirement, based on several studies, is five technicians for every professional engineer. If you're just starting a technician program, a ratio of 2 to 1 or 3 to 1 is probably a reasonable target to shoot for.

Recruiting—So, you're convinced that technicians can help you. Where do you find them? Vic Buescher, manager of technical placement for Thompson Products, points out the four major sources: Casual applicants; production workers who show promise; high school graduates; technical school graduates. Becoming more common is recruiting on high school levels. Firms such as Cleveland Electric Illuminating Co. have devised earn-and-learn programs. While taking courses at night for an engineering degree, the young high school graduate works at CEI during the day as a technical assistant to an engineer.

Don't overlook technical schools. Those organizations—such as Milwaukee School of Engineering, Milwaukee; Alliance College, Cambridge Springs, Pa.; and Aeronautical University, Chicago—generally offer two-year courses in technical subjects. The National Council of Technical Schools says 69 institutions had 27,000 full-time students and 34,000 part-time students as of Jan. 2, 1955—an increase in enrollment of 19 per cent in a year. In 1956, an estimated 14,000 technicians will be graduated from the nation's technical institutes, some 60 per cent of the anticipated total for engineers. To get institute graduates, you will probably have to have a recruiting program nearly as elaborate as for graduate engineers.

Starting salaries for technicians vary widely, but the upper limits for experienced individuals are probably about $600 monthly. The "average" range is $300 to $500. Experts on technician programs think it best if personnel are paid on a salaried, not hourly, basis. Most technicians are men, but wartime experience proved that women are adept at some jobs, particularly drafting and standard testing and other laboratory work.

Training—The technician usually should serve his basic training through apprenticeship, a technical institute or extension school classes. The tuition involved is often subsidized by the company. Big firms may run what amounts to a private institute. L. E. Saline, manager, headquarters region, engineering personnel services, General Electric, points out that his company has a technical course designed to give training in fundamental engineering principles which is beyond the technical institute level. The curriculum includes calculus, mechanics, elasticity, electricity, motors, electronics and fluid flow. A technician may also participate in departmental courses. For example, the department manufacturing jet engines might offer courses in combustion phenomena, vibration and stress analysis and heat transfer.

Companies also write their own or adapt other manuals to help technicians. Solar uses manuals extensively. In 1947, General Motors started developing its *GM*

What Is an Engineering Technician?

. . . at Westinghouse Electric Corp.'s Air Arm Division

- Technical Writer
- Pilot
- Mathematician
- Inspector
- Illustrator
- Typist
- Model Maker
- Clerk
- Aide
- Technical Associate
- Librarian
- Blueprint Operator
- Draftsman
- Coilmaker
- Spare Parts Analyzer
- Reproduction Machine Operator
- Flight Test Mechanic
- Dictaphone Operator
- Engineering Production Planner
- Tabulating Machine Operator
- Vari-Type Machine Operator
- Microfilm Operator
- Sheet Metal Man
- Handy Man
- Laboratory Assistant
- Messenger
- Change Order Analyst
- File Clerk
- Technical Clerk
- Expediter
- Stenographer
- Storekeeper

To start a program for technicians . . .

1. Determine what work your engineers think is most readily delegated to technicians

2. Sell your engineers on the need to delegate and on the advantages of co-operating fully in a technician program

3. Recruit your prospective technician carefully. He should have average intelligence or better, at least a high school education and engineering interests

4. Hire your technicians on a salaried basis

5. Arrange for manuals or other types of written instructions on the work you propose to give technicians

6. Be prepared to devote part of your engineers' time to instructing technicians

7. Arrange with local technical schools or colleges for outside courses your technicians may need. Additional work in math and physics is the most common requirement. Companies often pay part of the tuition

Drafting Standards, a design manual that's the bible for Cadillac's technicians. On-the-job training is always a must and is the backbone of training any technician.

Placement — General Electric believes placement procedures for technicians need refining. It has found that many of the interests a technician held while at school change considerably with experience in industry. One GE technician, for example, was interested only in jet engine design when first employed. Now he's working on a research project concerning transistors.

At GE about 70 per cent of technicians are in engineering and testing laboratories, while 10 per cent have gone into research, 8 per cent into manufacturing, 4 per cent into sales and 8 per cent into service.

Administration—If you have a lot of technicians and an elaborate training program for them, a director for the whole setup is essential. Although Cadillac's 230 technicians work with the individual engineers and supervisors on the job, Mr. DeMause provides over-all direction for the program.

Dr. S. W. Herwald, engineering manager of Westinghouse's Air Arm Division, stresses the need for careful planning in the use of technicians. "In our experience," he says, "some engineers work most effectively alone, and some are able to utilize several other people, at the most five to seven." GE's Dr. Saline notes that engineers may have to be taught how to supervise and how to delegate responsibility.

Role—American Bridge's J. D. Rollins, vice president-engineering, thinks it possible to have too many technicians. **Some spots on the subprofessional level should be left open to serve as training ground for neophyte engineers.**

Technicians can't do everything, but they can do a lot. They are to engineers what pharmacists are to doctors.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

The Slide Rule War

We're neck and neck with Reds in race for engineers and scientists now; they'll take lead

TODAY, THERE are half again as many engineering students in Russia as there are in the U. S. Engineering enrollment in Soviet institutions of higher learning is 266,000, versus 156,000 in similar schools here.

The ratio will be even worse in the next decade. Russia graduated 63,000 engineers in 1955, compared with the U. S. total of 22,329. We hope to boost our figure to 38,000 by 1960.

Neck and Neck—Graduate engineers in the U. S. now number between 500,000 and 535,000; Russia has about 540,000.

Unless a "crash program" is instituted to increase the number of engineers and scientists, says a Library of Congress report, we are "in desperate danger of falling behind the Soviet world" in this critical field of competition.

Sciences, Too—Against Russia's 50,000 science graduates in 1954, the U. S. produced 31,178. The quality of the Soviet graduate is not to be discounted either: "The training given Soviet engineers and scientists is of a high order and compares favorably with the best in the U. S. and Europe," states the report issued by the Library of Congress.

To replace normal losses, provide for research and maintain a partial state of mobilization for defense, current U. S. needs of 30,000 to 35,000 new engineers each year may be increased by 3,000.

If Western Europe is taken into account, the Free World is still ahead of Russia in the manpower race, having about 1.2 million engineers and scientists to Russia's 900,000.

What To Do—Inadequate training and discipline in the high schools, a failure of colleges to expand their facilities and encourage students to complete their courses, deficiencies in military draft policies—all are cited by educational leaders as major causes of the present situation. Needed: More scholarships for worthy students; more recruiting of students; a reappraisal of draft policies.

Enough Zirconium for All

Deliveries will start in 1957 on the AEC's order of 11 million lb. If new production facilities go in on schedule, there'll be zirconium for civilian use, too

BY 1958, there will be enough zirconium to meet both defense and civilian needs. The metal will cost roughly half its present price.

That's the significance of last week's announcement from the Atomic Energy Commission that it has signed contracts with three producers for 11 million lb of the metal. Deliveries are to start within 16 months and will be continued for five years.

Capacities — National Research Corp., Cambridge, Mass., National Distillers Products Corp., New York, and Carborundum Co., Niagara Falls, N. Y., are the successful bidders. All will build new plants to handle the job. Combined capacity will be over 4.5 million lb a year, by comparison with present production of a little over 325,000 lb a year.

AEC's firm take will be 2.2 million lb of this. However, in addition to its definite commitments, the contracts also give it priority on about another 1 million lb of the metal. It may not take all of this. That means at least 1.3 million lb will be available for nondefense use, perhaps as much as 2.3 million if AEC doesn't use all of its priorities.

Breakdown — National Research's contract is for 700,000 lb a year. "We want plenty of elbow room to compete for civilian business," say company executives, "so we're going to build a plant that will be substantially over the 1.5-million-lb mark." It will go up at Pensacola, Fla., and will be run by a newly formed operating subsidiary, NRC Metals Corp.

National Distillers has the biggest AEC contract, 1 million lb a year. It's building at Ashtabula, O. Capacity is announced at 1.5 million lb. Says R. E. Hulse, vice president-research: "New production techniques and high volume will combine to bring the price of reactor-grade metal down from $14 a pound to $7, and of commercial grade from about $10 to as low as $3.50."

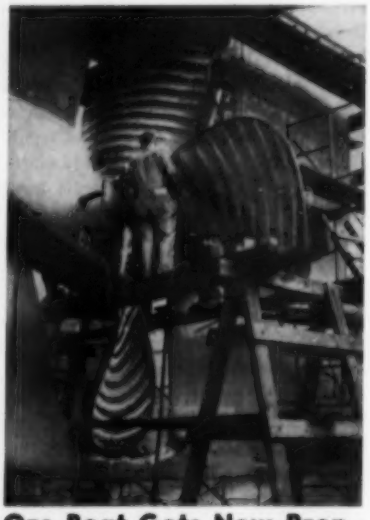
Carborundum's new plant will be at Parkersburg, W. Va. With present facilities (Carborundum has been the only large supplier of sponge to the AEC), the company's capacity will also be in excess of 1.5 million lb.

Yardstick—"Zirconium is as important to the nuclear reactor industry as copper is to the electrical industry." That's how Manson Benedict, vice president-research for National Research, sums up the significance of the news.

A major roadblock to all types of atomic energy installations will be removed. Zirconium is needed to clad the uranium fuel elements to prevent corrosion. In particular, the nuclear ship program is expected to get a boost. The chemical industry provides a good example of expected benefits to civilian industries. Its annual loss from corrosion is estimated at $5 billion a year. Used in tanks, pipes, valves and other processing equipment, zirconium can "substantially reduce" this bill.

Acceleration—AEC sources point out that when the tentative proposal for bids was put out last August, the target was only 2 million lb for the five-year period. Since then, seven more nuclear submarines have been approved. One will have two nuclear reactors. And the Navy is also seeking approval of an atomic light cruiser, plus a design for a carrier reactor. The carrier itself may be proposed in 1958.

AEC's zirconium procurement program will cost it some $14 million a year. Metal prices are subject to revision within established ceilings at the end of each year. To meet defense needs while the new plants are being built, these measures are to be taken: 1. AEC will import 200,000 lb of the metal from Japan. 2. Output of the Bureau of Mines pilot plant will be increased to 300,000 a year for two years. The plant will be operated by Wah Chang Corp., New York. 3. Carborundum Corp. will be asked to increase output of its existing facilities by 125,000 lb a year.



Ore Boat Gets New Prop

Stainless steel will be used to propel the *Arthur M. Anderson* this year. It's new practice for Great Lakes shipping. The carrier belongs to Pittsburgh Steamship Division of U. S. Steel Corp.

ODM Ups Freight Car Goal

Tax help for the construction of 59,000 freight cars is being considered by the Office of Defense Mobilization.

ODM listed two requirements for companies desiring to qualify for fast tax write-offs. Firm orders for freight cars must have been placed by Dec. 31, 1955, and the companies must have applied for fast amortization permits by Apr. 26, 1956.

The expansion goal for freight cars was closed at the end of 1955, but at that time many companies had placed firm purchase orders or authorized construction of freight cars. Later the companies applied for fast tax write-offs (even though expansion goals were closed) because their orders were placed before goals were closed.

By reviewing applications on hand, for which firm orders were placed before the closing of expansion goals, ODM has, in effect, raised the original expansion goal of 436,000 to 495,000 freight cars.

Electric Power Demands Up

The industry will add 100 million kilowatts to its generating capacity in the next decade. Power consumption will hit 1.5 trillion kw-hr in 1966

HEAVY ELECTRICAL equipment manufacturers, already loaded with business, face still greater demands.

Having increased generating capacity from 50 million to 120 million kilowatts over the last ten years, the electric power industry plans a jump of around 100 million kw in the next decade. More than 28 million is already scheduled for installation, with about 15.6 million due to go into service in 1956 and 1957.

Historic — Ralph J. Cordiner, president, General Electric Co., says power consumption in 1966 "is expected to reach 1.5 trillion kw-hr, compared with an estimated 680 billion in 1956." He adds: "The historic growth rate of the electric power industry, doubling every ten years, has naturally accelerated with the rising standard of living."

To help meet increasing demands, General Electric will spend $500 million on expansion in the next three years, including an outlay this year of $175 million.

Private Money—Electric power facilities continue to be financed largely by private capital. Last year's record high of 120 million kw of generating capacity represented an increase of 12.5 million kw over 1954; of this increase, says Harllee Branch Jr., president, Edison Electric Institute, and president, Georgia Power Co., investor-owned companies installed 8.1 million kw, the federal government 3.7 million and local governmental agencies and co-operatives the remainder.

Emphasizing the strong outlook, Undersecretary of the Interior Clarence A. Davis says that the private electric industry estimates it will spend about $40 billion during the next ten years. Public and federal power producers will add another $10 billion plus. Mr. Davis also says that the seven nuclear power plants planned by the electric industry will cost about $350 million, of which only $55 million will be federal funds.

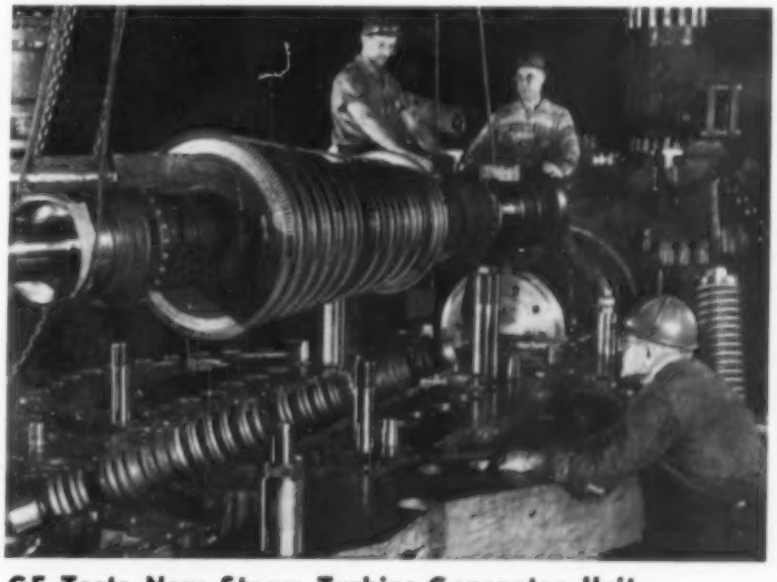
Above Average — Investment in plant and property of the electric companies at the beginning of this year exceeded $30 billion, compared with $12.5 billion ten years ago, according to Mr. Branch. Last year, he says, construction expenditures totaled $2.75 billion, against $2.84 billion the year before and an annual average of $2.1 billion for the last decade.

Where is all this electricity going? Of the 479 billion kw-hr sold last year, industrial consumers bought 247.8 billion, an increase of 23.8 per cent over the preceding year, according to Edison Electric Institute; residential sales were 120.5 billion, up 11.1 per cent; commercial consumers, 80.5 billion, up 9.7 per cent; and miscellaneous consumer categories, 30.5 billion. A substantial part of the increase in industrial consumption was for atomic energy purposes.

Rural areas figure heavily in the growth. Ancher Nelsen, rural electrification administrator, predicts that REA borrowers will add almost $1 billion in electric power facilities over the next five years.

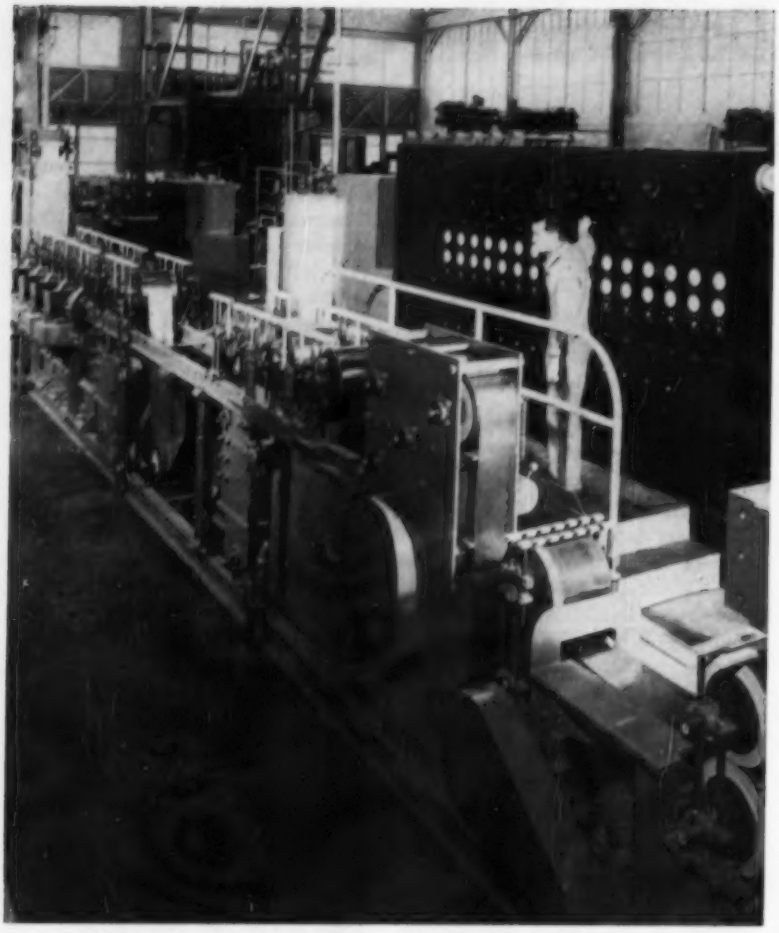
Turbine Demand—Huge demands upon heavy electrical equipment manufacturers are indicated by General Electric's order backlogs of heavy steam turbine generators (19 million kw, valued at $665 million, according to noncompany estimates). Orders are scheduled as far ahead as 1959. This year, 47 units of 5.2 million kw capacity will be shipped. W. E. Saupe, general manager of the company's large steam turbine-generator department, says that next year some 71 power makers with a combined 7.9 million kw of capacity will be shipped. Schedules are complete for the first four months of 1958, with orders for that year already totaling 4.9 million kw.

Recently, two five-year programs of $650 million (Consolidated Edison Co.) and $500 million (Consumers Power Co.) were announced. Allis-Chalmers Mfg. Co. reports its order backlog for steam turbine generators has increased "sharply" since Jan. 1. Company officials also anticipate a heavy demand for hydraulic generating equipment in the next two years.



GE Tests New Steam Turbine-Generator Unit

This power maker (the world's first commercial steam turbine-generator unit using supercritical pressure) is rated at 125,000 kw, says General Electric Co. Initial steam pressure is 4500 psi at a temperature of 1150°F



U.S. Steel's pilot electrolytic tinning lines develop improved techniques

New Research Center Opens

U. S. STEEL Corp.'s Monroeville, Pa., center represents the latest phase of America's industrial research program.

Consisting of the Edgar C. Bain Laboratory for Fundamental Research (named for U. S. Steel's vice president, research and technology division), and the Applied Research Laboratory, the center has four buildings with hundreds of technicians working on such varied projects as: Raw materials processing; refractory and mineral technology; sheet, bar, plate and forged products; chemical metallurgy; physics and analytical chemistry; electrochemical engineering.

Applied—The iron and steel industry in miniature is the best way to describe the activities of the applied research laboratory. Iron ore moves on a conveyor belt to mechanical agglomeration before processing in the experimental sintering machine. Plastic models of open-hearth and blast furnaces are used to study the flow of solids and gases in the furnaces.

Fundamental — Basic studies of electrical and magnetic phenomena, chemical equilibria, the properties of metals and reaction kinetics are just a few of the interests of U. S. Steel laboratory technicians.

Industrial research takes over 1 per cent of the national income. Where once new product research was considered sufficient excuse for the expenditure of millions of dollars, today industry is prepared to do fundamental research.

Republic and OMI

Its Order Makers' Institute will give 400 pipe distributors a course in selling

AT A TIME when Republic Steel Corp. can sell every ton of pipe it produces, the company is launching a distributor training program that may cost it as much as $1 million.

Called Order Makers' Institute (OMI), the program is designed to teach distributors selling techniques and more facts about Republic's pipe products. The course will be started by mid-month. If successful—and enthusiastic reactions to OMI announcements indicate it will be—the program will be extended to distributors of other Republic products.

What It Is—OMI consists of a series of six sessions, each to be given about a month apart. The first two will deal with selling, the next three with product information and the sixth will be a review. Nine movies will be used, plus flip charts and other aids. Movies deal with the production and uses of plastic and steel pipe.

Republic's 150 salesmen in the field will conduct the course. Each will preside over at least one series of six sessions — after getting pointers from Republic on how to conduct the meetings. About 400 series will be given (to personnel from each of its 400 distributors of pipe, Republic hopes). Average attendance of 15 at each meeting is anticipated. Meetings will be tailored to the kind of market the distributor serves. One version is for distributors primarily in industrial-merchant products; another is for those who serve the oil country market.

Why OMI?—Why should Republic do this for distributors, who sell for other companies, too, at a time when pipe is scarce? It's unusual for a steel company or anybody in capital goods manufacturing to take this approach. Republic believes pipe won't always be tight. With OMI, it hopes to gain: 1. Closer relationship with distributors. 2. Better selling by distributors and the company's own salesmen.

Development of 20-billion-ton Andean coal mine is under way

Help Wanted: Management

"MONEY we don't need. But we do need skilled technicians. And we'd be glad to team up with a good U. S. company and give them the management."

That's how Oscar Iragorri, spokesman for Industria Hullera San Francisco, sums up what it'll take to do a first-class development job on Colombia's vast coking coal reserves.

Black Diamond — According to IHSF, the proposition looks attractive. The company has 25,000 acres in the heart of the newly surveyed reserves in the Andes about 30 miles south of Cali, Colombia. The deposit is estimated at some 20 billion tons of coal.

By year end, IHSF hopes to push its production to 1000 tons a day. Almost all the output will go for export. Primary markets are steel mills in Argentina, Brazil and Chile. Later, attempts may be made to crack the Japanese market, among others. Japan buys 3.5 million tons of coal yearly from the U. S.

Detail—U. S. industrialist Henry J. Kaiser has proposed a pipeline to carry the coal to Buenaventura, where ship-loading facilities are being built by the Colombian government. But for the time being, rail shipping will be used. Coal will go first through a washing plant at Cali, also being built by the government, before it's shipped to Buenaventura.

IHSF has 300 cars ready, and is bringing about 200 miners in from Italy to supplement local labor. Mr. Iragorri says that coal seams are from 5 to 10 ft thick. They are to be worked with European machinery, specially designed for lateral seam mining.

Advice on Exports

If you do business in Argentina, you should either establish manufacturing facilities there, or enter license agreements with local firms.

So advises Anthony Bordes, export manager, Bassick Co., Bridgeport, Conn. He believes American companies are going to have increasing difficulty if they try to compete with Argentine firms on a straight export basis. Some good market possibilities, he says, are "spare parts, transportation equipment, industrial and agricultural machinery."

Mr. Bordes was addressing a conference sponsored by New England industry. Another speaker, Walter Hunnewell Jr. of Gillette Co., called attention to the growing value of sales promotion in all South American markets.

New Source for Copper

By late 1957, 2000 tons of rich copper ore may be coming out of Haiti.

Preparations for open-face and shaft mining are under way at a 50-square mile drilling site north of Port au Prince. The ore will be concentrated there and shipped to Canada for refining. Consolidated Halliwell Ltd., Toronto, is developing the mine.

Since last August, Pan American World Airways has flown in about 50,000 lb of mining tools and gear. Exploration started last year with three technicians and a diamond drill rig. Today, 100 Haitians are at work. According to William Plexman, president of Consolidated, development expenses may run up to $800,000.

Trade Notes

• U. S. Industries, Inc., New York, has acquired General Farm Equipment Co., Puerto Rico, as a step in its diversification and expansion program. Since 1930, when General Farm was founded on a $30,000 investment, it has grown to a net worth of about $1 million. Net sales last year were almost $3 million.

• U. S. firms with an eye on Venezuelan trade can get help from the U. S. Department of Commerce. For $2, you can get more than 50 trade lists of firms now doing business there. Each list also shows basic trade and industry data by category.

Caterpillar Tractor Co.

No New Scrap Controls

Two surveys in works are aimed at determining just how much scrap there is. The industry says consumers want controls on exports to keep the domestic price down

INDICATIONS are for iron and steel scrap exports to continue at an active pace through 1956—though below the record 5 million tons of last year because of some reaction to high prices and new European pig iron capacity. Immediate prospects are for no new governmental controls.

Debate—The scrap controversy, pointed up in Congressional hearings to extend the export control act which is scheduled to expire June 30, revolves around two main views:

1. Big scrap users, semi-integrated steel producers and foundries, testify that scrap has been in short supply in 10 of the last 14 years and that the nation's potential scrap supply should be inventoried to make sure there is enough to sustain domestic industry; those users admit there is plenty of scrap now—though at a price, but the question is: Will there be enough six months from now?

2. The scrap industry says that because of present favorable prices it is in a position to supply record tonnages of scrap, enough for domestic use and for export. The industry contends that scrap consumers are trying to effect price control on the scrap industry through controls on exports.

Clouding the Issue—Just how much scrap is potentially available? A House Banking Committee report states: "Testimony before the committee indicates that we cannot permit scrap exports to continue at the present rate of 5 million tons a year . . . some means must be found, either through agreements with the foreign producers to whom we are now exporting scrap, or through imposition of stricter controls under the export control act, to reduce exports of scrap to a level where we can be reasonably sure of an adequate supply for domestic needs." (The Commerce department, which administers the act, is strongly against controls at present.)

Plans—In the works are two scrap surveys:

1. To determine the generation of prompt industrial scrap. This would be done by BDSA; paper work is already in the mill, but still needed is Budget Bureau approval. A July start is hoped for.

2. To check the supply of obsolete scrap. This is a tougher job and is still in the formative stages. It will probably be made by an independent research outfit (Battelle Memorial Institute reportedly is one candidate). Here, too, the goahead depends on government putting up the money. Though industry groups have indicated they would be willing to back the survey themselves if the government drops the ball.

Aluminum scrap users have proposed export cutbacks. They want: The quota to be 1500 tons a quarter; leaded foil aluminum scrap to be part of the quota; the government to make no stockpile call for aluminum in the second half of this year.

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Inland's Lowe: New Look in Treasurers

PLAYING WATCHDOG over company funds is no longer the sole job of today's finance officer. Increasing in importance are responsibilities for funds over which a company in reality acts in a trustee relationship, says William H. Lowe, Inland Steel Co.'s treasurer.

Funds that Mr. Lowe must keep tabs on include the Inland Steel Foundation and the firm's pension funds. "There is an apparent trend toward more of these funds," he relates. "For example, some companies have profit sharing, others have SUB plans."

New Approach—"For the financial officer, these special-purpose funds demand new and different approaches than those in handling company money. Inland's foundation, for example, was set up so that the company's policy toward contributions to welfare agencies, educational grants, etc., could be maintained on a consistent basis, rather than depending upon year-to-year business fortunes. This year, a half million dollars will be contributed from the foundation, and to keep these on an even keel, we maintain several years' reserves in the fund."

Pension plans, like other deferred compensation arrangements, present different problems, he points out. Computing probable disbursement requirements and investing the funds are key considerations. Profit sharing and pension plans involve investment in common stocks as well as government bonds and other liquid holdings. Common stocks offer an opportunity to offset any inflationary forces on pension plans—but the investment must still be on a long-term basis rather than on day-to-day gains of the Wall Street investor. Inland's pension fund investments currently are in a 60 per cent fixed income and 40 per cent common stock ratio.

Stock option plans are a relatively new type of employee benefit program, says Mr. Lowe, and often involve concurrent savings by payroll deductions, as in the case of Inland. Where the option period is relatively short, keeping the accumulated funds liquid should be the primary objective, he believes, so that they are available when the employee decides to use his savings to exercise his option or to withdraw them.

Biography—Bill Lowe was born 39 years ago in Windsor, Ontario. After graduating from University of Western Ontario, he attended the Harvard Graduate School of Business Administration. He joined Inland in 1940 as a member of the college training group. He served in the Army from '43 to '46 and returned to Inland in the office of the secretary. Appointed assistant secretary in 1948, he became assistant treasurer in 1950, and gained his present title in 1954.

"I have no outside hobbies," he says. "My youngsters—a boy, 4, and a girl, 2—are hobby enough for the present."

How To Prepare for Labor Negotiations

Budd Co.

CHICAGO firm "X" set up a new job in its packing department. It established a rate it considered fair —based on comparable plant jobs— and notified the union for its approval.

Did the job start the following Monday as planned? No. In fact, it didn't begin until after nearly three weeks of company-union haggling—and this was over a shop rule that had no connection with the new job, its department or personnel.

The lesson: In preparing for coming contract negotiations, consider the noneconomic issues as carefully as you do the economic issues. The key to successful labor negotiations is advanced planning.

Tailored Negotiating—True, settlements being made in your area currently and the coming "big steel" talks will set a pattern for your talks. But it's only a pattern: You should be prepared to negotiate a contract to meet your company's labor policy. Too many firms, particularly the smaller ones, do nothing until the union submits its demands. Then they look for compromises between the demands and status quo as a defensive move.

Make a survey of wage increases being granted in your industry and by other companies in your area. "The increase," says W. W. Miller, Stewart-Warner Corp.'s vice president of industrial relations, "is more important than the wage level. Wage rates vary from area to area and industry to industry. Unions place greater emphasis on securing uniform increases than on trying to bring all rates into balance. However, if your rates are generally in the lower level, there's always pressure to raise them."

Note of Caution—When comparing jobs and rates, check job descriptions carefully. A lathe operator in one plant may be classified as a machinist in another.

Wage statistics are readily obtainable. Sources recommended by H. S. Olsen, Minneapolis-Honeywell Regulator Co.'s director of personnel and industrial relations: Local employer groups, Bureau of National Affairs, Commerce Clearing House, Research Institute of America and national associations. Companies are exchanging information more freely too—many learned in the prewar period that secrecy often provided the union with a tool to play one company against another.

Questions—Know your break-even point—it's important in today's booming business climate with unions emphasizing higher wage boosts. Major considerations: What's your profit position and capacity to absorb higher wage costs? Can you increase prices and remain competitive? If business turns downward, how will your operations be affected? What will it cost to take a strike—in profits, in time, in markets, in competitive position?

Many industrial relations executives feel the noneconomic issues can be even more important than the dollar-and-cent contract provisions. Foremost: Preventing provisions which restrict management's right to manage.

Caution—"Stay away from the so-called mutual agreement clauses," advises Selwyn H. Torff, labor consultant with Seyfarth, Shaw & Fairweather of Chicago. "In the light of modern industrial

relations, such procedures might seem almost desirable for some provisions. But they're dangerous because they can spill over into other phases of contract operations and become a type of veto power."

Seniority is an area in which details should be spelled out carefully in the contract. Management should guard against seniority clauses which restrict its incentive and opportunity to introduce new and improved production processes or facilities. Seniority provisions can be crippling if they permit transfer of people to jobs they can't do. On the same subject, many industrial relations men frown upon contracts which obligate a company to train people for a job to which seniority rights transferred them.

Protection—With the negotiation of a labor contract comes the inference that there will be no strike during the contract period. But, today, most companies are spelling out in "no strike" clauses protection against strikes, sit-downs, stay-ins, walkouts, slowdowns and other forms of work interruption.

Another feature appearing in most contracts is the "entire contract" provision. This reads to the effect that the *whole subject of collective bargaining* is completed in the agreement. "By law, as was shown in the steel industry, regarding pension talks in 1949," Mr. Torff points out, "unless contracts contain such a clause, the union may be able to force negotiations on any subject not covered in the contract. In the steel case, the 1949 contract was open only to wages and social insurance. But the courts ruled that pensions were a collective bargaining item, and because the issue was not covered in the contract, the unions had the right to demand negotiations on the issue."

Improvement — Don't overlook the opportunity to improve the provisions of your present contract. Study past grievances to see where most of the trouble spots originated to determine if possible clause changes would correct the problem. Grievance procedure should be set up exclusively for interpreting the contract—not as a procedure for perpetual collective bargaining.

As Stewart-Warner does, go to your foremen and supervisors for suggestions on which contract changes can be made to make the agreement more workable. Chances are you'll find the union receptive to most suggestions which will cut down the number of grievances.

Realism—Finally, after you've made careful preparations for your coming bargaining sessions, be realistic when you submit your proposals to the union. Sure, the union negotiator's first demands are extreme. But don't forget his job depends upon bargaining. If he were to submit a realistic 10-cent demand and get it on the first day, his members would feel that he let them down because he could have gotten more with a fight.

You have nothing to gain by being extreme—in fact, extreme counterproposals may create a hostile atmosphere that could be damaging.

Tactics—Bargaining table tactics depend a great deal on the personalities involved. Choose your team wisely—three to five members is a good number. Management representatives must be thoroughly familiar with production and operating practices and how they are related to the contract. Representatives should be men respected by the union.

Many smaller companies have the advantage of being represented by an area association—Associated Industries of Cleveland, for example, helps negotiate some 600 contracts each year. Companies without such help often find their representatives no match for the union negotiator. The reason: Bargaining for the union negotiator is a full-time job; for the executive it's a once-a-year, part-time chore. If this is your plight, it may pay you to check the possibility of calling in a labor consultant. His negotiating experience, plus his contacts with a wide cross section of companies and industries can be valuable to you.

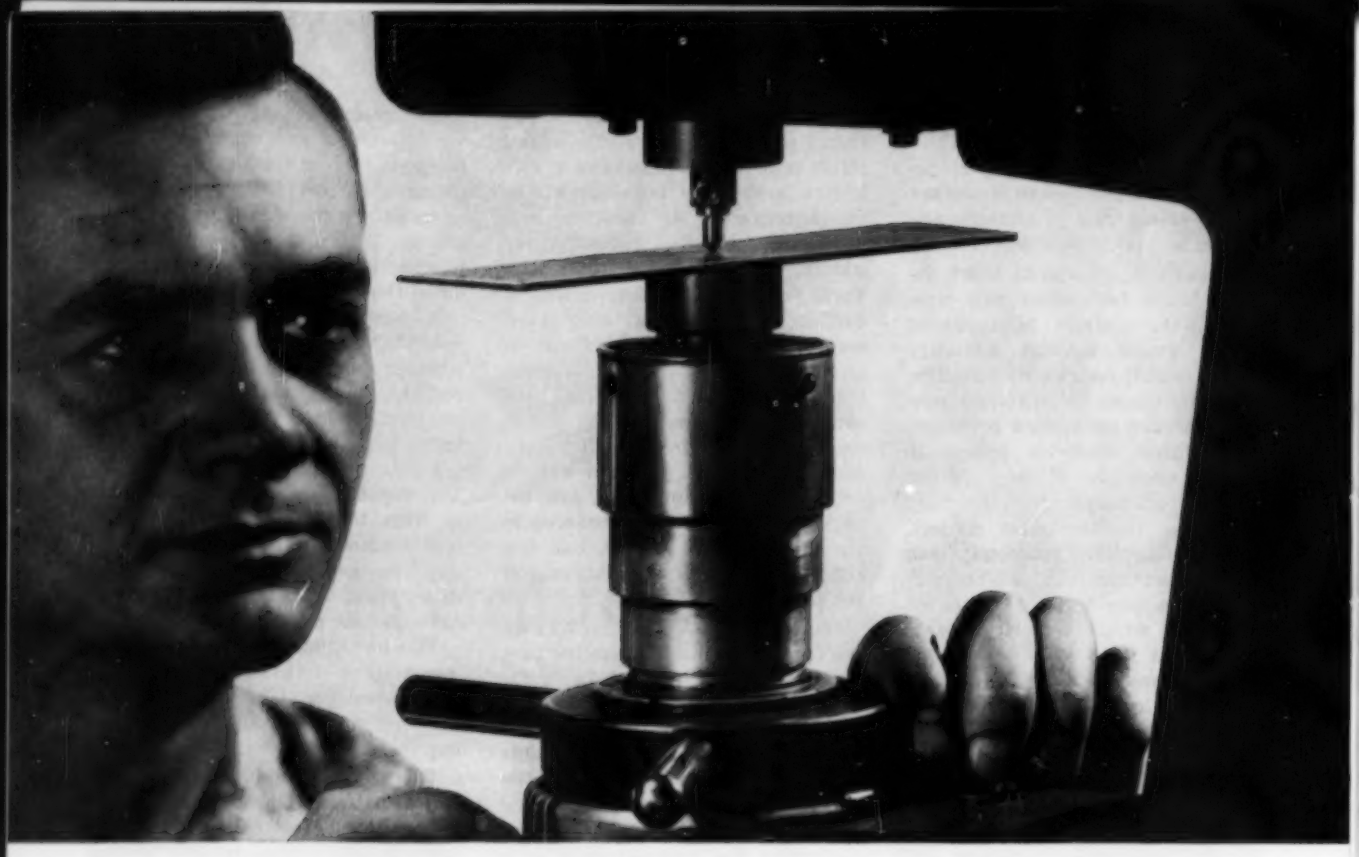
Regardless of who represents you, careful advance planning is a must in labor negotiations. It can mean the difference between bargaining on your toes—or on your knees.

Ready To Talk Contract?

You will be after you . . .

1. **Make a survey of comparable wage rates and fringe benefits of companies in your industry and area**
2. **Check with plant managers, supervisors and foremen for suggestions on how to make the contract more workable**
3. **Study union demands to determine which are "musts" and which are designed as trade items**
4. **Prepare a realistic company contract proposal to submit to the union**
5. **Know how big a package you can afford in the light of business outlook, competitive situation, profit picture**
6. **Study noneconomic issues to prevent contract provisions which will restrict your rights to manage**
7. **Carefully select your bargaining team. Representatives should be articulate, familiar with contract operations, respected by union**

** An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*



How Great Lakes Steel *puts the pressure* on quality

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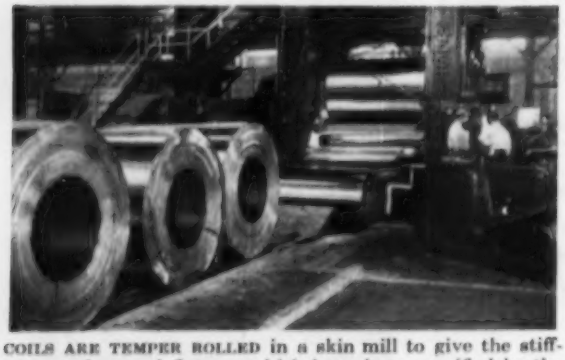

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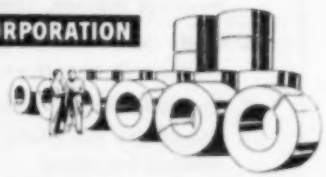
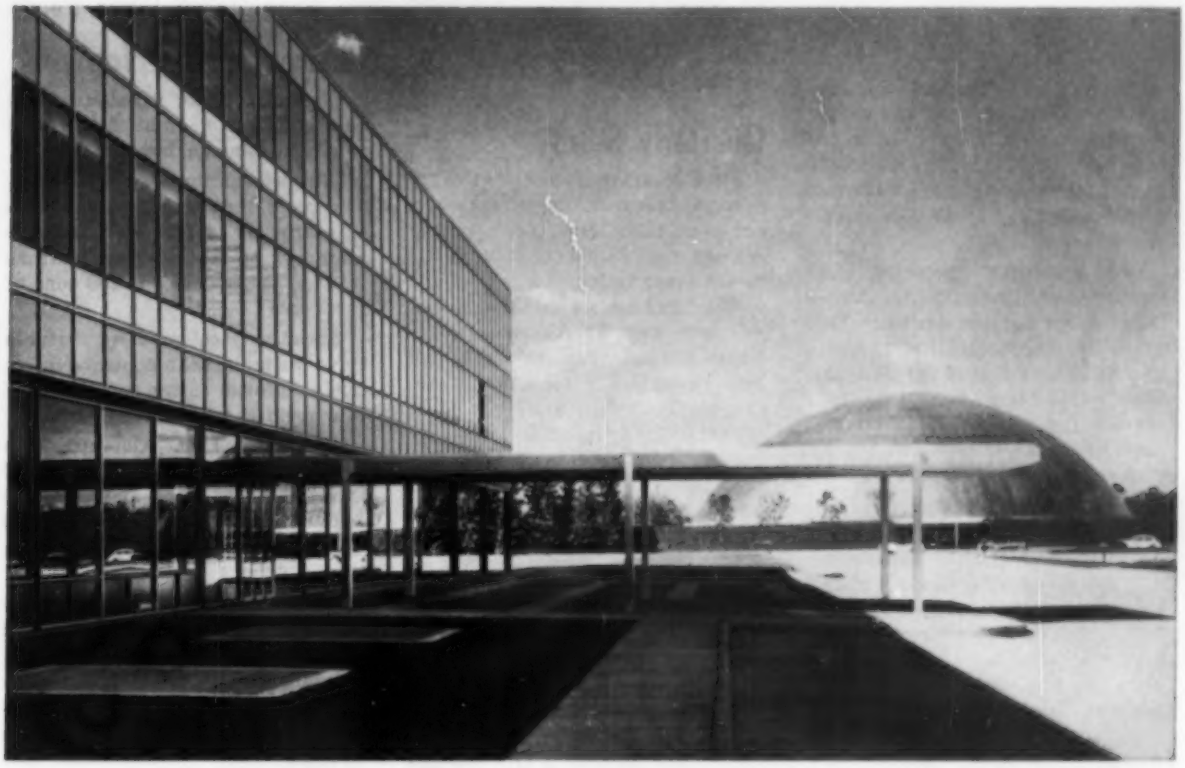


District Sales Offices: Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston, Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.



At left: Styling Administration building. In background: Styling auditorium of GM's Tech Center

GM Unveils Technical Center

It will function as the corporation's central intelligence agency. It collects information, carries on its own projects and acts as consultant to any division

GENERAL MOTORS CORP., Detroit, dedicates its $100-million Technical Center next week. The 320-acre area is a giant checkerboard of color and futuristic structures which contain over 2.2 million sq ft of floor space.

Harlow H. Curtice, GM's president, sums up the purpose of the center this way: "We are always seeking ways to make things better and do things better." The Tech Center places the facilities for doing this in one spot.

Vast Scope—Few persons realize the amount of scientific and production research which go into making and selling modern automobiles. Thousands of techniques and devices are developed which will never be seen on cars, but all may contribute to making a better automobile. A look at some of the functions of the center show how thorough the job can be.

The Technical Center houses four general staff organizations: Research, engineering, styling and product development. Styling and product development, which are part of GM's manufacturing staff, have units in each division of the corporation.

Research—This staff unit develops fundamental information which may help any of the technical groups within GM. Its work covers metallurgy, physics, chemistry and some mechanical engineering. Research also helps divisions solve special problems.

Engineering's staff concentrates on long-range development work with automotive engines, suspension, body structures and the many component parts which go into cars. It covers special design projects which are beyond the research stage, but are not ready for production development by a division.

Styling—Central styling and design has a separate studio for each automotive division. Other studios serve the Frigidaire and nonautomotive groups. By concentrating styling activities in one location, GM can keep a central theme running through its products.

This does not mean that divisional stylists shirk competition. Each group guards its designs from other divisions just as it

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would from Ford or Chrysler stylists.

Process development deals with projects aimed at improving manufacturing techniques which lower costs, sharpen efficiency and upgrade quality. It has a foundry which can melt 1800 lb of metal an hour. Other facilities include plating labs, instrumentation and machine shops, as well as a special project unit.

Service — All operating and maintenance work at the center falls to the service section. This group is responsible for 11 miles of roads, 85 acres of parking lots, plant protection, utilities, food service for more than 4000 employees and general administration.

It's evident that this setup puts the Tech Center in the position of an industrial central intelligence agency. Not only does it collect information from each division, but it also carries on its own projects and acts as a consultant to any division which may have a problem.

Policy—"If industry can afford failure, it is in the research laboratory," says Charles L. McCuen, vice president and general manager of the research laboratories division.

GM's research policy is to explore the future continually. Its program aims at a balance between pure and applied science. Total work is divided into fundamental science, engineering research and advanced engineering development.

The Physics and Instrumentation department is carrying out a basic study of magnetism to find out more about how force is transmitted through space. That's pure research. On a more practical basis, this department has developed an infrared spectrograph to study engine exhaust, paint deterioration and fuel composition.

Other developments of the Research staff are copper-lead bearings, bright copper plating, tellurium-treated malleable iron and an instantaneous silver plating process.

Future—Although many of the functions of the Technical Center overlap separate divisions and even individual staff assignments, the end result is a storehouse of knowledge which pays off in making better automobiles. (For more on the technical functions of the center, watch for STEEL's roundup May 14.)

Quarterly Sales

First quarter factory sales of automobiles in the U. S. were 13.6 per cent below last year's period, reports the Automobile Manufacturers Association.

They include 1.7 million passenger cars and 308,698 trucks and busses. Last year, over 2.1 million passenger cars and 260,420 commercial vehicles were sold in the first three months.

Sales to overseas markets during the quarter totaled 127,113 units (6.2 per cent of all sales), compared with 123,739, or 5.2 per cent, for the same quarter in 1955.

Production, which has been about 20 per cent off the 1955 quarterly pace, continues to slow down as auto makers attempt to pare dealer stocks even more.

Ward's Automotive Reports claims industry hopes still are high for a return to peak selling rates toward the final quarter. Prospects of price increases on '57 models should insure an orderly '56 model cleanup, thinks *Ward's*.

U. S. Auto Output

Passenger Only

	1956	1955
January	611,190	659,508
February	554,801	674,951
March	575,559†	792,436
1st Qtr.	1,741,550†	2,126,895
April		752,245
May		723,868
June		648,412
July		658,696
August		613,705
September		460,443
October		517,788
November		749,061
December		682,256
Total		7,933,369

Week Ended	1956	1955
Mar. 31	125,850	177,295
Apr. 7	133,354	168,002
Apr. 14	136,038	175,133
Apr. 21	129,930	180,647
Apr. 28	129,385†	184,279
May 5	128,400*	172,031

Source: *Ward's Automotive Reports*
†Preliminary *Estimated by STEEL

Chevvy's Plastic Top

Chevrolet Motor division of GM can stamp out eight fiber glass Corvette tops an hour.

The process involves a pushbutton press that weighs about one-fifteenth as much as ordinary stamping presses. Its power stroke is 1 in., yet it develops 150 tons of pressure.

Stainless steel molding surfaces have variable heat controls to insure uniform curing of the fiber and resin compound.

Preforms of the Corvette tops are built up from three layers of 2-ounce fiber glass mats treated with a binder, covered with a veil and coated with resin to give a glossy finish.

In production, the upper die of the press is lowered into final position by an electric hoist. A vacuum chases out air bubbles in the layers of fiber and resin. A rubber bag is inflated to force the dies together. Untrimmed tops weigh about 12 lb.

New Jaguar

A five-seater Jaguar, the "Two-Point-Four," has been announced by Johannes Eerdmans, president of Jaguar Cars North American Corp., New York.

Mr. Eerdmans says the new model will cost $3795 fully equipped. The 6-cylinder, short-stroke engine has twin carburetors and twin overhead camshafts.

The sports car has an integrated chassis-body assembly. Extensive use of rubber is supposed to dampen most road noise. The car is claimed to average 25 miles per gallon.

Exhaust Notes

• Richard T. Purdy, president of American Motors (Canada) Ltd., reports that Rambler sales soared nearly fourfold in the company's first three months of operation this year.

• Buick dealers delivered 17,603 cars the second ten days of April. That's a 21-per-cent increase over the previous ten-day period.

THIS

Verson

PRESS BRAKE

. . . combines multiple production operations for TEMCO

CATALOG B-55 gives design details and specifications of Verson Press Brakes. Write for your copy.

This Verson Press Brake accomplishes in *one stroke* all the jobs that formerly required several operations. As manufacturers of a complete line of residential gas heating equipment, Temco, Inc., Nashville, Tenn., uses a Verson Model No. 308 Press Brake to gang punch and notch corners and holes in flat sheet steel parts . . . speeding the complete production process and reducing overall cost of operation. Flanges on the bed and ram give the brake unusual versatility and assure its easy adaptability to changing requirements.

Verson Press Brakes are designed and built for long life and superior performance. The allsteel welded frame assures constant alignment of bed, ram and housing. Long square type gibs are adjustable and spring loaded shoe type brakes provide complete control for the operator.

If you now use press brakes, or are doing a job that could be adapted to a brake, it will pay to investigate Verson.

A Verson Press for every job from 60 tons up.

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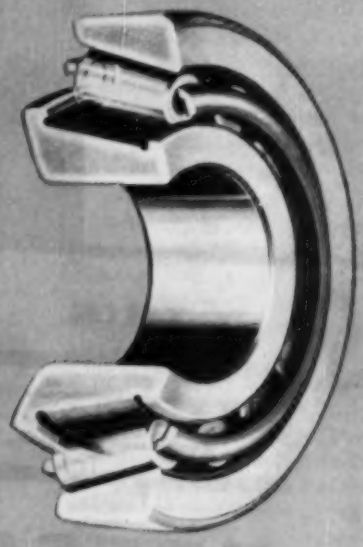
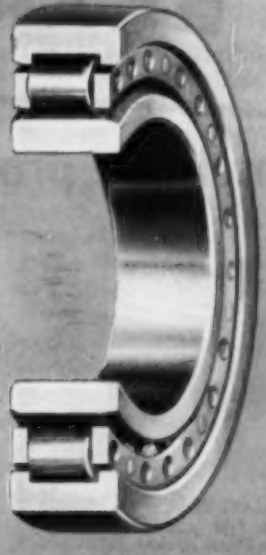
Let a Bower engineer give you full details of the complete Bower line. Call him in while your product is still in the design stage.





BOWER ROLLER BEARINGS

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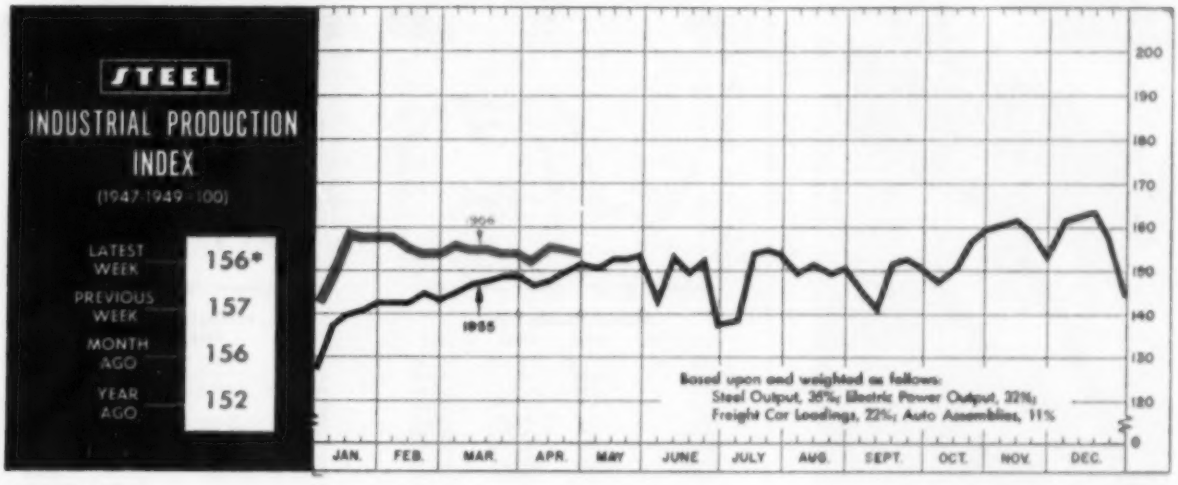

*Week ended Apr. 28

Appliance Makers Help Fill the Gap

APPLIANCE makers are making talk about a good year, but what's more important, they are putting their words into actions. Heavy first-quarter production has done much to fill the gaps left by a few other durable goods industries, and industry spokesmen believe the rest of the year will be just as good.

Factory sales of home washers and dryers in the first quarter ran 14 per cent ahead of the corresponding 1955 period (see charts, page 72) and 5 per cent ahead of the record fourth quarter last year. A seasonal decline in production is expected for the summer months, but industry officials say they expect to hold onto that 14-per-cent advantage over the year. This could mean factory shipments of about 5.5 million units this year.

Cyclical — To look at the figures of the radio and television manufacturers (see chart, page 73), one might get the idea they are having a poor year, but they claim just the opposite. Radios, other than for autos, are running ahead of year-ago shipments, and final 1956 figures may well be 10 to 20 per cent ahead of 1955's. Auto radios, which make up about half of total production, will depend on the auto industry's fortunes later this year. But producers are hoping for an increase in these shipments after auto makers unveil 1957 models. As for TV sets, spokesmen say they are going through a two-year cycle, the trough of which is appearing now. (The peak came in first quarter last year.) The upswing will come later this year and balance out total production at about the same level as last year.

Vacuum cleaner sales are setting new records every month—20 months in a row through March, reports the Vacuum Cleaner Manufacturers' Association (see chart, page 73). Producers of this appliance see nothing but increased sales ahead and hope to keep the string of broken records going. They feel the coming increase in the rate of family formations is in their favor.

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,450[1]	2,473	2,331
Electric Power Distributed (million kw-hr)	10,900[1]	10,894	9,699
Bituminous Coal Output (1000 tons)	9,895[1]	10,050	8,610
Petroleum Production (daily avg—1000 bbl)	7,145[1]	7,129	6,836
Construction Volume (*ENR*—millions)	$526.0	$536.4	$458.5
Auto, Truck Output, U. S., Canada (*Ward's*)	166,828[1]	167,634	231,021
TRADE			
Freight Car Loadings (1000 cars)	750[1]	763	730
Business Failures (Dun & Bradstreet)	250[1]	252	212
Currency in Circulation (millions)[3]	$30,260[1]	$30,290	$29,657
Dept. Store Sales (changes from year ago)[3]	+1%	+11%	+11%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$21,135	$23,098	$19,661
Federal Gross Debt (billions)	$276.0	$276.0	$277.0
Bond Volume, NYSE (millions)	$21.5	$23.9	$20.9
Stocks Sales, NYSE (thousands of shares)	12,610	11,635	12,881
Loans and Investments (billions)[4]	$85.5[1]	$85.4	$84.9
U. S. Govt. Obligations Held (billions)[4]	$27.7[1]	$27.7	$34.1
PRICES			
STEEL's Finished Steel Price Index[5]	209.10	209.10	194.53
STEEL's Nonferrous Metal Price Index[6]	277.9	277.7	237.1
All Commodities[7]	113.7	113.5	110.4
Commodities Other Than Farm & Foods[7]	121.4	121.3	115.8

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,893; 1955, 2,413,278. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

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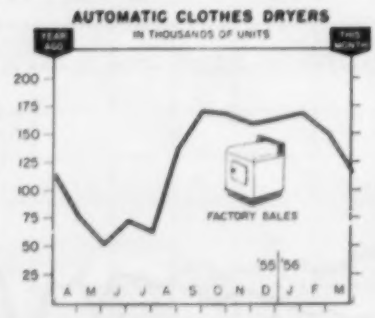
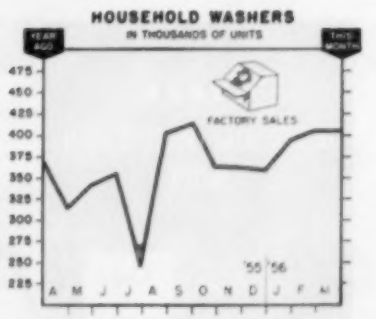
THE BUSINESS TREND



Factory Sales—Units

	1956	1955	1954
Jan.	166,243	115,383	82,195
Feb.	148,522	109,215	62,488
Mar.	113,631	113,498	51,796
Apr.	.....	73,978	37,661
May	.....	49,228	26,533
June	.....	70,616	30,297
July	.....	60,516	40,755
Aug.	.....	136,190	80,165
Sept.	.....	169,905	107,084
Oct.	.....	166,889	122,182
Nov.	.....	157,153	138,254
Dec.	.....	161,823	115,341
Totals	.....	1,384,394	897,751

American Home Laundry Mfrs. Assn.



Factory Sales—Units

	1956	1955	1954
Jan.	393,797	357,354	249,956
Feb.	405,631	353,214	295,171
Mar.	405,744	370,555	307,862
Apr.	.....	313,461	258,712
May	.....	341,759	246,944
June	.....	354,470	303,455
July	.....	245,879	242,863
Aug.	.....	403,770	293,243
Sept.	.....	414,919	379,666
Oct.	.....	362,335	339,169
Nov.	.....	361,341	308,368
Dec.	.....	357,503	264,803
Totals	.....	4,236,500	3,490,212

American Home Laundry Mfrs. Assn.

Charts copyrighted, 1956, STEEL

Keeping Cool—One of the biggest seasonal factors in major appliances — air conditioners — is just now gaining momentum. Bruce D. Henderson, vice president in charge of Westinghouse Electric Corp.'s air conditioning division, predicts sales for that industry as a whole should be 30 per cent higher this year than last. While not so encouraging as this report, makers of other appliances indicate that 1956 is going to be at least as good as 1955 or better.

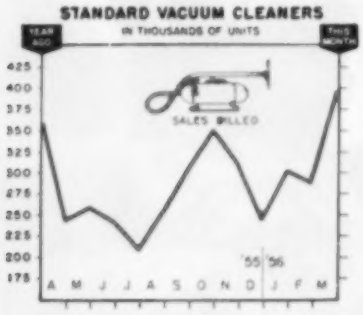
Dealer Stocks Too Heavy?

One steel producer last week told STEEL that he feels there will be an easing in the appliance makers' demands for steel this summer because of exceptionally high inventories in the hands of dealers. When asked about this, most manufacturers said they didn't consider inventories too high. "Our product is a quick mover from the factory to the dealer. If there were any backing up at the other end, we'd know about it almost immediately, and so far there are no signs of it." Appliances have taken much of the steel that auto makers have freed during the first quarter. At present, it doesn't look like there will be much change in that pattern.

New Orders, Backlogs High

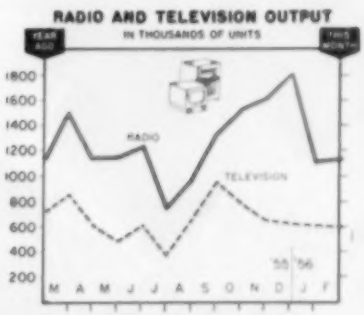
Even if there were a slackening in appliances, the gap would be filled by other users of steel. The American Gear Manufacturers Association reports its sales index reached 276.5, the highest level since the base period of 1947-1949 = 100 was adopted in 1952. The new order index for industrial supplies and machinery registered 206.7 in March, reports the American Supply & Machinery Manufacturers' Association Inc. This is the highest since April, 1951.

The Industrial Heating Equipment Association Inc. says orders received by its members during the first quarter set a peacetime record and were 64 per cent above the comparable period last year. Manufacturers of resistance welding equipment hold a record backlog considerably in excess of $20 million, reports the Resistance Welder Manufacturers' Association. New orders in 1956 have been coming in at better than $5.5 million a month. Machine tool builders, according to the National Machine Tool Builders' Association, are sitting pretty with a backlog worth 8.6 months



Sales Billed—Units	1956	1955	1954
Jan.	302,203	248,941	221,233
Feb.	286,386	261,183	199,035
Mar.	496 686	356,444	276,464
Apr.	.....	241,879	220,849
May	.....	255,941	200,434
June	.....	239,728	186,781
July	.....	206,758	193,607
Aug.	.....	252,691	185,397
Sept.	.....	306,507	238,235
Oct.	.....	349,654	263,197
Nov.	.....	307,267	237,882
Dec.	.....	243,457	217,022
Total	.....	3,270,441	2,658,136

Vacuum Cleaner Mfrs. Assn.



	Radio		Television	
	1956	1955	1956	1955
Jan.	1,079	1,068	588	655
Feb.	1,094	1,099	576	703
Mar.	.....	1,482	.....	831
Apr.	.....	1,100	.....	583
May	.....	1,114	.....	467
June	.....	1,205	.....	590
July	.....	718	.....	344
Aug.	.....	948	.....	648
Sept.	.....	1,302	.....	940
Oct.	.....	1,500	.....	760
Nov.	.....	1,581	.....	632
Dec.	.....	1,786	.....	605
Total	.....	14,895	.....	7,757

Radio-Electronics-Television Mfrs. Assn.

of production. New orders for March advanced to 322.7 (1945-1947 = 100.)

The significance of these reports is that should the demand for any one or two of them slip off, the others would rush in to fill the gap.

STEEL's Index Stays Steady

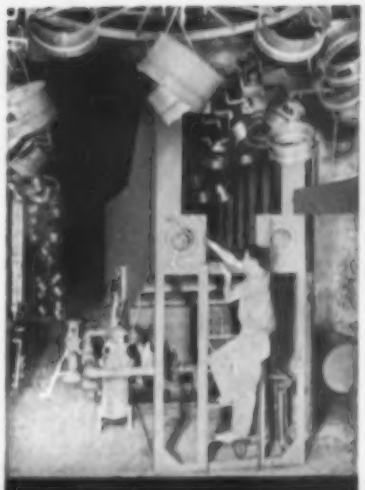
That the gap has been filled is evident from STEEL's industrial production index, which registered a preliminary 156 (1947-1949 = 100) for the week ended Apr. 28. It was 157 the previous week on the strength of steadily increasing freight car loadings and continued heavy steel production. Electric output, which is usually weak at this time of the year, is showing surprising strength, testimony of high industrial activity. The weak spot in the index is still automotive, and it will get weaker before it gets stronger. Auto production so far this year is 21 per cent behind the 1955 pace, says *Ward's Automotive Reports*. Some persons given to daydreaming have wondered what production would have been like if automotive production had remained at 1955 levels. Chances are the general business level would not have been too much higher because of the lack of raw materials. If the steel mills were selling to motordom at last year's rate, other users would not be going as strong now.

April Showed Up Better

The National Association of Purchasing Agents says that the main feature of business today is the rolling adjustment taking place in the high level of industrial activity. Those reporting worse conditions in April were balanced out by those reporting better conditions. However, 58 per cent of the respondents to the monthly questionnaire reported that April was better than they had anticipated it would be, while only 11 per cent were disappointed.

Auto Suppliers Do O.K.

For automotive suppliers, this "filling in" is of prime importance. Typical is the comment by Cleve H. Pomeroy, president of National Malleable & Steel Castings Co.: "Automotive cutbacks caused some reduction at the company's malleable foundries, but this was more than offset by increased orders from the railroads."



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Add to this a substantial increase in production, and you realize the higher efficiency NuTone has achieved, while saving more than $900 per week!

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Hardtem Die Blocks are forged to obtain optimum structure from a special Heppenstall alloy steel—hardened and tempered until the correct physical properties are obtained. They must be uniform in hardness . . . able to hold closer tolerances and provide longer-lasting impressions.

Then they're shipped to you to afford the maximum wear, heat, and shock resistance demanded for your finest workmanship.

You can trust Hardtem's top performance — for its quality is under constant study and development by both Heppenstall's engineering and research staffs.

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T. J. PHILLIPS
. . . Alloy Steels president

C. M. HORAN
. . . gen. supt. at Indiana Harbor Wks.

A. O. Willis was named manager of manufacturing for **National-U. S. Radiator Corp.**, Johnstown, Pa.

E. H. Titchener & Co., Binghamton, N. Y., elected **Russell F. Schreiber** executive vice president and treasurer; **T. W. Whipple**, vice president-sales; **Edward T. Wayne**, vice president and director of engineering, and **Miss Elsie R. Schaefer**, secretary.

John R. Davey was made manager, metallurgical department, **Acme Steel Co.**, Chicago. He joined the company in 1954 as assistant chief metallurgist.

Frank Delaplane was named plant manager of **Kaiser Aluminum & Chemical Corp.'s** Erie, Pa., forging mill. He was production manager of the Halethorpe, Md., extrusion mill.

Douglas L. Heisler was appointed purchasing manager of **Worthington Corp.'s** Harrison, N. J., division to succeed **George F. Guidner**, retired. Mr. Heisler was general purchasing assistant at Worthington.

Roger A. Yoder, formerly secretary-treasurer, was named a vice president of **Detroit Steel Corp.**, Detroit. **J. A. Hartman, N. H. Siegel** and **G. A. Longeway** were elected treasurer, secretary and controller, respectively.

T. J. Phillips was elected president, **Alloy Steels Inc.**, Detroit. He was executive vice president. **Herbert F. McHalpine** was elected vice president-sales. He was sales manager.

Richard S. Ralph was made general sales manager, **Turner Brass Works**, Sycamore, Ill. He was general sales manager of Harrison Sheet Steel Co. **Benno W. Nitz** becomes sales manager of Turner's fuel appliance division. He was supervisor, eastern sales division.

Alfred A. Bown was made general manager, **Hunter & Havens Inc.**, Bridgeport, Conn. Associated with the company for many years, he has served for the last 24 as a sales representative in the southern Connecticut area.

H. E. Schroeder joined **Roylyn Inc.**, Glendale, Calif., as production manager. He was assistant to the president of Ohlsson & Rice Inc.

Robert G. Keller was made chief engineer, machine division, **Lewis Welding & Engineering Corp.**, Cleveland.

Anthony J. Astrologes and **Ivan A. Dickey** were elected vice presidents of **Indiana Steel Products Co.**, Valparaiso, Ind. Mr. Astrologes is also treasurer. Mr. Dickey, former sales manager, is now vice president-sales.

C. M. Horan was made general superintendent of the steel plant at the **Indiana Harbor Works** of Youngstown Sheet & Tube Co., East Chicago, Ind. He was superintendent of the Campbell and Hubbard plant blast furnaces in the Youngstown district. **Emmett E. Holmgren** was made chief inspector at the Indiana Harbor Works.

Wade N. Harris was elected president, **Midland Steel Products Co.**, Detroit, to succeed **William A. McKinley**, now chairman. Mr. Harris was executive vice president. He joined Midland in 1954 and formerly was a vice president of Murray Corp. of America.

Wallace Schermer was appointed sales manager, material handling division, **Union Steel Products Co.**, Albion, Mich. He succeeds **H. W. Hildebrand** who recently resigned to establish his own sales organization in southern Ohio.

Clayton A. O'Neill joined **Wellman Bronze & Aluminum Co.**, Cleveland, as manager, permanent mold division. He was superintendent, light metals division, Thompson Products Inc.

Gilbert E. Jones was made general sales manager, electric accounting machines division, **International Business Machines Corp.**,

FREDERICK WALKER

FRANCIS H. EICHLER

. . . American Smelting & Refining vice presidents

New York. He replaces **Orland M. Scott.**

American Smelting & Refining Co., New York, elected **Frederick Walker** vice president in charge of its Federated Metals Division and **Francis H. Eichler** vice president in charge of the purchasing department.

Marlin H. Snow was appointed purchasing agent of **Ferry Cap & Set Screw Co.,** Cleveland. He succeeds **Henry J. Thiel,** retired.

Philip J. Siegel was named general manager, **Master Fan Corp.,** Los Angeles.

J. W. Bramley was made Boston district sales manager, tubular products division, **Babcock & Wilcox Co.**

D. W. Rice was made product sales manager, conduit division, **National Electric Products Corp.,** Pittsburgh. He was in charge of surface raceway sales.

Copeland Refrigeration Corp., Sidney, O., appointed **Charles Streck** factory manager of its compressor manufacturing operations.

Juston D. Williamson was named sales manager for **General Pipe & Supply Co. Inc.,** Compton, Calif.

Robert W. Powell, Chicago regional manager, was promoted to general sales manager of **Fafnir Bearing Co.,** New Britain, Conn. He is succeeded by **Chauncey W. Olson,** former Moline, Ill., district manager.

Earl L. Shepherd was promoted to superintendent of **Republic Steel Corp.'s** rod and wire mills at Gadsden, Ala. He succeeds **H. M. Carr,** retired.

Benjamin J. Davis was made general manager and sales director of **Athol Machine & Foundry Co.,** Athol, Mass.

Frank L. Sonneman and **Howard R. Swartz** were elected vice presidents of **Pittsburgh Screw & Bolt Corp.,** Pittsburgh. They joined the company in January as assistants to the president.

E. L. Miller was elected assistant general manager, **Cooper-Bessemer Corp.,** Mt. Vernon, O. Serving directly under the president and general manager, Mr. Miller has responsibility for the over-all operations of the company.

Sherman R. Lyle was made Cleveland district manager, steel and tube division, **Timken Roller Bearing Co.** He replaces **R. P. Donnell,** now New York district manager for the division.

Sands G. Falk was made manager of marketing research, a new post in the sales department of **Falk Corp.,** Milwaukee. **David P. Miller** succeeds Mr. Falk as manager of steel casting and weldment sales.

Edward O. Gotway was made chief purchasing agent of **Curtis Mfg. Co.,** St. Louis. He succeeds **John A. Hecker,** retired. Mr. Hecker was vice president-purchasing.

P. B. Proctor was appointed director of the west coast division of **Avco Mfg. Corp.** Headquarters are in Beverly Hills, Calif. **James R. Kerr,** Avco vice president who previously headed the west coast division, will be in charge of Avco's new office of defense planning in New York.

Edward B. Washburn was made finishing superintendent at the **Waterbury Mfg. Co.,** division of

FRANK L. SONNEMAN

HOWARD R. SWARTZ

. . . vice presidents of Pittsburgh Screw & Bolt

The Best

are the easiest

to get

Standardized gearing in stock . . .

housing sub-assemblies in stock . . .

and standardized pinions in stock . . .

mean faster deliveries from stock!

FOOTE BROS.
LINE-O-POWER SPEED REDUCERS

Standardized interchangeable gearing – by Foote Bros. – lets you specify and get the particular reducer you want, in the quantities you need, direct from stock! Duti-Rated Lifetime Gearing in a complete range of interchangeable sizes, ratios and capacities are stocked and ready for assembly. Capacities range up to 200 H. P., ratios to over 2700 to 1. Standard foot and flange type cast housings are stocked, too, for straight or right angle drives. The drives you want are assembled from stock components and shipped as soon as your order is received. For a complete index to the almost endless variety of Line-O-Power reducers immediately available, write for your copy of the Line-O-Power catalog today. See for yourself how you can get more for your drive dollar . . . faster!

This trademark stands for the finest industrial gearing made!

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Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION

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HERBERT H. ROGGE
. . . executive v.p., ACF division

JOHN E. THOMPSON JR.
. . . asst. gen. supt., Gary sheet mill

ROBERT G. WILLAMAN
. . . president of Peterson Steels

Chase Brass & Copper Co., Waterbury, Conn.

Herbert H. Rogge was elected executive vice president, **American Car & Foundry Division**, ACF Industries Inc., New York. He was president of Canadian Westinghouse Co. Ltd.

Pheoll Mfg. Co., Chicago, consolidated its special and standard products operations into a newly formed commercial products division. **N. J. Sell** was named division director of manufacturing and **William T. Ylvisaker** general sales manager.

Sidney M. Bleecker was named executive vice president in charge of sales of **Bleecker Steel Products Corp.**, newly formed subsidiary of World Steel Products Corp., at New York.

Richard J. Howlett succeeds the late **William H. Bolte** as plant manager at Atlanta for **Buick-Oldsmobile-Pontiac Assembly Division**, General Motors Corp.

John E. Thompson Jr. was made assistant general superintendent of the Gary, Ind., sheet and tin mill, **U. S. Steel Corp.** He succeeds **Robert Freeman** who transfers to the Columbia-Geneva Steel Division. Mr. Thompson was superintendent of the sheet mill division.

Robert P. Reed was named southern California sales manager by **Arcadia Metal Products**, Arcadia, Calif.

At **Carrier Corp.'s** Unitary Equipment Division, Syracuse, N. Y., **Burton T. Kehoe** was made assistant to the general manager and **Arthur E. Meling** was named manager of the new Weathermaker department.

Howard Scheidle was made Philadelphia district sales manager for **Electric Controller & Mfg. Co.**, division of Square D Co.

George Peters was named director of promotions for **Spee-Flo Co.**, Houston.

Robert G. Willaman was elected president of **Peterson Steels Inc.**, Union, N. J. Formerly executive vice president, he succeeds **N. S. Peterson**, now chairman.

Robert W. Marvin, general manager, engineering works division, was elected a vice president of **Dravo Corp.**, Pittsburgh.

W. Graham Hall succeeds the late **Edson D. Dronberger** as Los Angeles district sales manager for **Armco Steel Corp.**

John W. Marshall was made west coast sales manager of **Hoffman Laboratories Inc.**, Los Angeles.

Robert N. Nanninga joined **Fansteel Metallurgical Corp.** as west coast sales engineer, electrical contact division. He has offices in South Pasadena, Calif.

Allegheny Ludlum Steel Corp. named **Perry R. Bish** to the new post of chemical engineer in the general engineering department, Pittsburgh.

OBITUARIES . . .

Harry A. Ewing, 61, president and chairman, **Hillcrest Crank & Machine Co.**, Pleasantville, Pa., died Apr. 21.

Frederick B. Rentschler, 68, chairman, **United Aircraft Corp.**, Hartford, Conn., died Apr. 25.

Robert E. Fruin Sr., 86, founder of **Fruin Drop Forge Co.**, Chicago, died Apr. 23. He retired two years ago as president and treasurer.

M. W. Vernan, 72, former president of **Al-Can Steel Corp.**, San Diego, Calif., died Apr. 18.

J. E. McLaughlin, manager of the New Kensington, Pa., works of **Aluminum Co. of America**, died.

Arthur B. Howe, retired manager of **Joy Mfg. Co.** at Claremont, N.H., died Apr. 18.

James N. Skinner, 53, former vice president, **Skinner Chuck Co.**, New Britain, Conn., died Apr. 14.

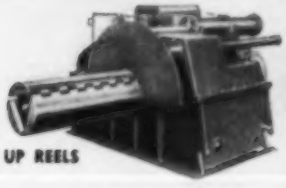
"YOUNGSTOWN" EXPERIENCE PAYS OFF IN BETTER RESULTS FOR YOU

Steel Mill Equipment - Heavy Machines - Complete Lines

SCRUBBER & CLEANING LINE

PARALLOY ROLLING MILL ROLLS
MERCHANT—ROD—BAR—SKELP

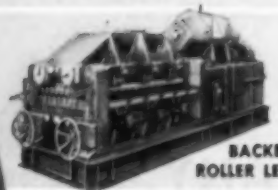
36" CONTOUR ROLL LATHE



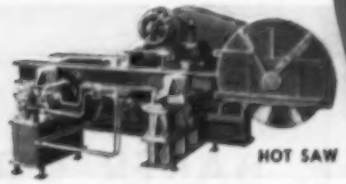
TAKE UP REELS

SLAB PUSHER

90" x 240" x ⅛" STRETCHER LEVELER



BACKED UP ROLLER LEVELER



HOT SAW

DUCTILE RUN-OUT TABLE ROLLS

"Youngstown" Machinery serves major steel mills from coast to coast

"Youngstown" is well-known for its 70 years of experience in the designing, engineering and building of heavy, steel mill machinery. Pictures at left show a few examples . . . Complete lines—major units and auxiliaries. Additional "YF&M" products include ductile iron gears, rolls and castings up to 100,000 pounds.

"Youngstown" also builds extrusion presses and equipment for the "light metals" industry.

Modern Pickling Line cuts costs for western mill

Better pickling with less acid consumption . . . "Youngstown's" latest high speed continuous strip pickling line utilizes a new pull-thru type TRIPLE SCALE BREAKER that eliminates the need for a pinch roll stand.

Complete Scrubber Line built for midwest plant

This typical sheet scrubber line provides the ideal solution to the cleaning problem involving enamel sheet stock, dry or oiled stock, sheets for tin plating and special service sheets.

36" Contour Roll Lathe wins laurels for new improvements

Completely hydraulic tracer control insures smoother, more accurate finish. Featured improvements provide better turning, either on necks or centers. Built to suit specific needs.

Slitting Line speeds production for brass manufacturer

This complete 25" slitting line for brass and copper is giving "right-for-the-job" service. "Youngstown" has the correct answer for any slitting problem, whether it is .002" brass, copper, aluminum, or ⅜" steel plate.

Ductile Run-out Table Rolls excel in hot strip mill

Ductile cast iron rolls are reducing maintenance in leading mills. Especially good under the sprays. Resist heat check and breakage. Ductile iron is the ideal maintenance material for aprons, roller boxes, looper tables and looper rolls.

Consult us about your problems.
Let us quote on your requirements.

The Youngstown Foundry & Machine Co.

SERVING INDUSTRY SINCE 1885

Youngstown, Ohio

FAMOUS FIRSTS IN THE IRON & STEEL INDUSTRY

There was a span of 22 years between the time the first American blast furnace was completed, until the time the first ton of iron was commercially produced.

In 1620 John Berkeley and a group of followers left England to build the first ironworks in America at Falling Creek, Virginia. As Berkeley and his crew cleared the land, erected houses and began constructing the furnace, the ever-present, suspicious Indians watched in the background.

Just as the blast furnace was to begin operation on March 22, 1622, the Indians attacked the ironworks and surrounding settlement. During the ensuing massacre the Indians killed all but one of the 384 colonists, and completely destroyed the furnace.

It was not until 22 years later, in Massachusetts, that the first successful American ironworks began producing iron.

Fortunately, the beginning of BAKER'S MAGDOLITE, the original dead-burned dolomite was more successful, because BAKER'S MAGDOLITE—then as now—offered producers lower refractory costs, increased furnace efficiency and more uniform ingots. It's MAGDOLITE's superior, properly burned, grain-sized particles that make the difference. BAKER'S MAGDOLITE is always 5 ways better: Composition, Preparation, Strength, Economy and Quality. The next time you order dead-burned dolomite, specify BAKER'S MAGDOLITE.

1-55

ANOTHER FAMOUS FIRST

JEBCO
PRODUCTS
SINCE 1889

BAKER'S MAGDOLITE

The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO

AS&W Installs Mill

New rod facility at Cuyahoga Works will handle 1050-lb billets; capacity is 450,000 tons

YOU'LL have a better chance of filling your rod and wire needs soon. American Steel & Wire Division of U. S. Steel Corp. is ready to place its new rod mill at the Cuyahoga Works, Cleveland, into full operation. Its "shakedown cruise" is well under way.

The mill will handle billets 3.25 in. square and 30 ft long, weighing 1050 lb each. Its predecessors used 600-lb billets.

The rolling range is from No. 5 rod (about 7/32-in.) to 1.5 in. Rated annual capacity is 450,000 tons.

Boosts Efficiency — Harry L. Jenter, manager of operations, Cleveland district, says: "This new, high-speed production equipment, plus increased bundle size, will enable customers of American Steel & Wire to achieve maximum efficiency.

"Many customers in the bolt, screw and other fastener industries, welding, spring and automotive part business have material handling equipment capable of handling rod bundles in excess of 1000 lb. The larger bundles also lend themselves to the continuous operation of present-day manufacturing equipment."

In addition to the rod mill, the expansion project included new billet and rod handling equipment and storage areas.

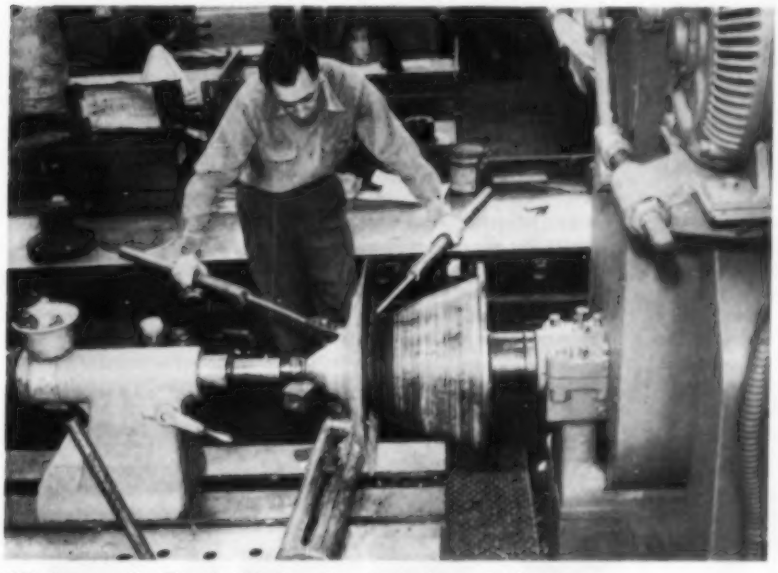
Foundry Installs Furnaces

Empire Steel Castings Inc., Reading, Pa., has installed new, $85,000 Ajax induction melting furnaces. They will enable the foundry to increase its line of corrosion resistant steel castings —at least six more grades of stainless. The company now offers over 35 different steel and alloy grades from the same pattern equipment.

Alcoa To Build Alumina Plant

Aluminum Co. of America, Pittsburgh, will build an alumina plant costing more than $45 million on a site adjacent to its primary aluminum smelter at Point Comfort, Tex. The plant will produce more than 500,000 tons of alumina annually. First production is scheduled for early 1958. Alcoa anticipates doubling initial capacity of the new plant by 1965, to satisfy the company's expected increased

(*Please turn to page* 85)



"Spinners" Find Niche in Jet-Age Industry

Craftsmanship still plays an important role in jet-age manufacturing operations, usually considered highly mechanized. This worker in Glenn L. Martin Co.'s plant in Baltimore is spinning the nose of a guided missile. Extremely contoured parts are made by pressing the metal over the spinning form blocks in the lathe

Q. What steel shot provides
FASTEST CLEANING
+ LOWEST SHOT CONSUMPTION
+ LOWEST EQUIPMENT MAINTENANCE
= Lowest Cost Cleaning

A.
WHEELABRATOR®
STEEL SHOT

Wheelabrator Steel Shot is the only shot that gives you all the qualities vital to lowest COST cleaning and peening. Its high hardness gives super cleaning speed. Its toughness gives extra long life for minimum shot consumption and low maintenance costs. Wheelabrator Steel Shot has so proved itself that it now outsells all other steel abrasives combined. It outsells because it outperforms. Try it today. It's the low-cost answer to your cleaning problems. Write today for your copy of Catalog 89-C.

Now available in new S.A.E. size S-280 shot

WHEELABRATOR CORPORATION

509 South Byrkit Street
Mishawaka, Indiana

This is good housekeeping..

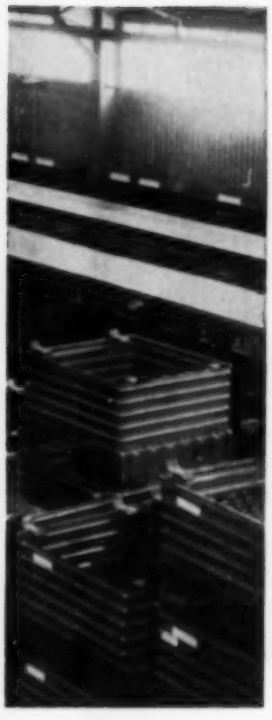
GOOD HOUSEKEEPING MAY REQUIRE ADDITIONAL PLANT FACILITIES. Republic's Truscon Division can supply you with those facilities in a standard steel building. Illustrated is one of many types and sizes produced by the world's largest manufacturers of metal building products. Truscon steel buildings offer the economies of standardization—plus fire protection, ease and speed of erection, low upkeep, high investment value. They're low in cost and additions can be made easily and economically as space needs change.

GOOD HOUSEKEEPING CAN ALSO BUILD GOOD EMPLOYEE RELATIONS. For example, modern steel lockers that conserve space and still provide clean, safe storage for employees' clothing and valuables are made by Republic's Berger Division. Illustrated is the Republic "Space-saver" two-person locker. It provides separate compartments for two people in no more floor area than that required for one large single-tier locker. Berger offers a complete locker planning, engineering and installation service.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels



PB-120-T BOX AND SKID UNITS used by Chiksan Company are equipped with welded tiering lugs which permit tiering to any practical height. Units are easily lifted and rapidly trucked to any point on the production line or in the warehouse.

WEDGE-LOCK STEEL SHELVING made by Republic's Berger Division assists Chiksan greatly in keeping more accurate records, uses less space and provides easy visible identification of parts. It is specifically designed for high stacking of enormous weights. Completely flexible, it assembles quickly and easily.

HOW REPUBLIC MATERIALS HANDLING EQUIPMENT SAVED SPACE AND REDUCED HANDLING COSTS 25%

The above photos were taken in the Brea, California, plant of the Chiksan Company, makers of ball-bearing swivel joints. They have been using Republic Materials Handling Equipment for about eighteen months for both raw and finished materials.

Here are the results in the words of the Manager of Production and Material Control:

"Our experience is that much less space is required for storage of raw forgings and castings—which allows for better housekeeping and reduces handling costs 25%.

Inventories are much simpler and more accurate. Substantial time saving is realized.

Finished products are stored in both stack-type steel boxes and steel shelving. They assist greatly in keeping more accurate records, use less storage space and provide visible identification. We are able to do a better job with one less employee in the warehouse and to do good housekeeping with less effort.

The installation of these products was a wise and profitable investment."

Chiksan should enjoy future benefits as well. Maintenance costs should be reduced because construction features of all Republic Materials Handling Equipment assure long, efficient service at lowest per-year cost.

The PB-120-T Box and Skid Units illustrated on these pages are only one of many types manufactured by Republic's Pressed Steel Division. There is a wide range of sizes from which to choose. Or if you have a special handling problem, Republic engineers are available to help you design a unit to meet your specific requirements. Your Republic Materials Handling Equipment Dealer has all the facts. Or write us for more information.

The Material Handling Institute's Exposition Cleveland, Ohio 1956 EXHIBITOR

SEE OUR EXHIBIT AT THE EXPOSITION—BOOTHS 900-902

STEEL

and Steel Products

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Dept. K-8678-A
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Cleveland 27, Ohio

Please send more information on:

☐ Republic Boxes and Skids ☐ Truscon Steel Buildings
☐ Berger Wedge-Lock Steel Shelving ☐ Berger Lockers

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

POTTER & JOHNSTON

has the answers! *for example:*

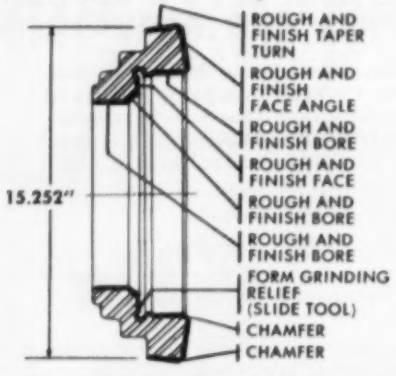
THE PROBLEM

BEVEL DRIVE GEAR
4629 STEEL FORGING
14 SEPARATE, CLOSE-TOLERANCE CUTS REQUIRED

THE ANSWER

FINISHED IN JUST 6.74 MINUTES
ON A P&J 6DREL-40 AUTOMATIC
with P&J-ENGINEERED TOOLING!

ONE OPERATION . . . Machining Time 6.74 Minutes



HEAVY LINES INDICATE MACHINED SURFACES

It's obvious, mathematically, that reducing the divisor in our formula will produce a bigger quotient . . . *your profit!* And it is equally obvious, from a practical point of view, that you can't solve *today's* machining problems profitably on machines built for yesterday's jobs. Here's a formula for profit proved in practice by dozens of manufacturers:

Modernize now with a P&J Automatic . . . like the 6DREL-40 . . . that has the speed, power and versatility to meet today's demands for faster, more accurate, lower-cost production. Team it with P&J-Engineered Tooling that takes full advantage of combined cuts and faster-cutting carbide tooling to reduce machining time to a minimum.

Start now . . . write on your Company letterhead for your copy of Bulletin No. 159 fully describing the P&J 6DREL-40 and 6DRE-40, and including complete engineering data.

Precision Production Tooling for more than Fifty Years

POTTER & JOHNSTON COMPANY

PAWTUCKET, RHODE ISLAND

SUBSIDIARY OF PRATT & WHITNEY COMPANY, INCORPORATED

MODERNIZE WITH POTTER & JOHNSTON . . . REPLACE FOR PROFIT

(*Concluded from page* 81)

smelter requirements, says F. L. Magee, executive vice president. Ben H. Sloane has been appointed manager of Point Comfort operations. J. Ranald Fox is works manager of the new alumina plant.

An ore unloading dock, which will cost about $3 million fully equipped, will be built as part of the project.

Warehousing Firm To Build

Emergency Steel Service Corp.'s Rolled Steel Products Division, Chicago, will build a 50,000-sq-ft warehouse and 6000 sq ft of office space on Touhy Ave., Skokie, Ill. The project will cost about $550,000. Rolled Steel Products will continue to use its present warehouse at 7415 N. St. Louis Ave., Skokie.

Textron Buys Benada Aluminum

Textron American Inc., Providence, R. I., purchased Benada Aluminum Products Corp., Girard, O., and will operate the property as a division. Benada has seven plants and reduces 5 million lb of aluminum monthly. The firm has six extrusion presses and makes storm windows and doors, aluminum siding, roofing, awnings and other products.

AT&T Plans Record Program

American Telephone & Telegraph Co. will spend $2.1 billion on construction this year. This is the first time any company has appropriated $2 billion for construction in a single year. Only two others—Standard Oil Co. (New Jersey) and General Motors Corp.—have ever appropriated more than $1 billion for a 12-month expansion program.

Ohio Ferro-Alloys Expands

Ohio Ferro-Alloys Corp., Canton, O., placed a new 15,000-kva electric furnace in operation at its Brilliant, O., plant. This is another step in an expansion program (estimated cost, over $2 million) started last year. The plant produces ferrosilicon and ferrochromium and is under the supervision of J. C. Smock. In March, the firm placed another

TOUGH **TWO-BRAKE** HOIST HANDLES LOADS SAFELY

Heavy-duty lifting is easy work for the Series "600" 'Load Lifter' Electric Hoist. Every part is tough and thoroughly reliable to protect man, load and hoist completely. The motor brake and the load brake act together, automatically. Each alone has the power to hold the load safely. Braking is so fast, the load doesn't drop back — accurate spotting is always assured.

The Series "600" 'Load Lifter' cuts hoisting time — lifts a ½-ton load at 30 FPM — at the push of a button. And, there are only 24 volts at the push buttons for extra safety. There is extra safety, too, in the steel suspension, rugged gearing, tough wire rope and non-fracturing hook. Construction is so simple, the hoist can be serviced in the air.

In every respect, the Series "600" 'Load Lifter' Electric Hoist gives you quality and performance that save on every lift. Capacities: ½ and 1 ton. Available in all types of suspension, including motorized trolley. *Get details from your "Shaw-Box" Distributor or write us for Bulletin 408.*

'Load Lifter'® ELECTRIC HOISTS

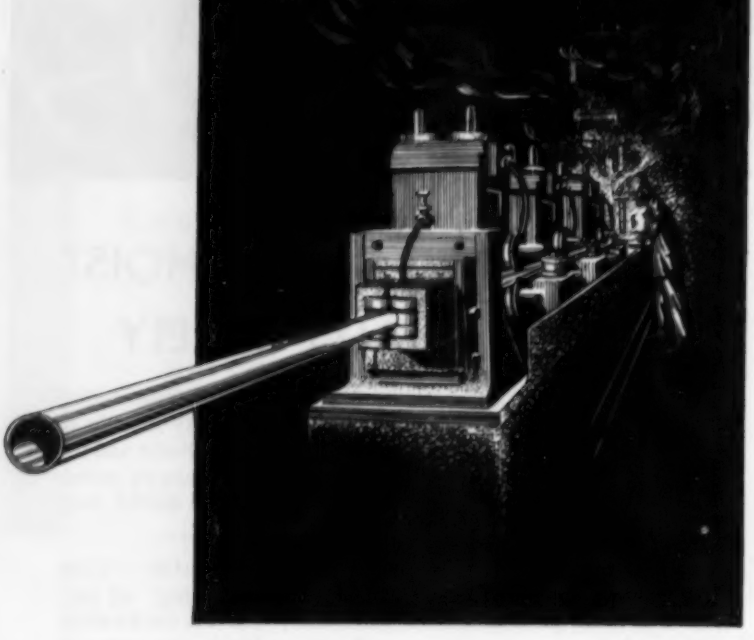
MAXWELL MANNING M&M MOORE INC. TRADE MARK

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

LACLEDE
STEEL
TUBING

electric, gas
and furnace weld



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QUALITY CONTROLLED
STEEL
to produce the best
in manufactured
products

LACLEDE

LACLEDE STEEL COMPANY
SAINT LOUIS, MISSOURI

15,000-kva electric furnace in operation at its Philo, O., plant.

Republic Plans Research Unit

Republic Steel Corp., Cleveland, plans to build a central research laboratory. One building will house offices, meeting rooms, a library and some photographic, x-ray and analytical facilities. A second building will house the principal laboratory facilities.

Anaconda Enlarges Facilities

Anaconda Wire & Cable Co., New York, is installing extensive equipment for the production of paper-insulated, lead-covered telephone cable. The facilities will be in production during the second half of this year.

Cambridge Brass Incorporates

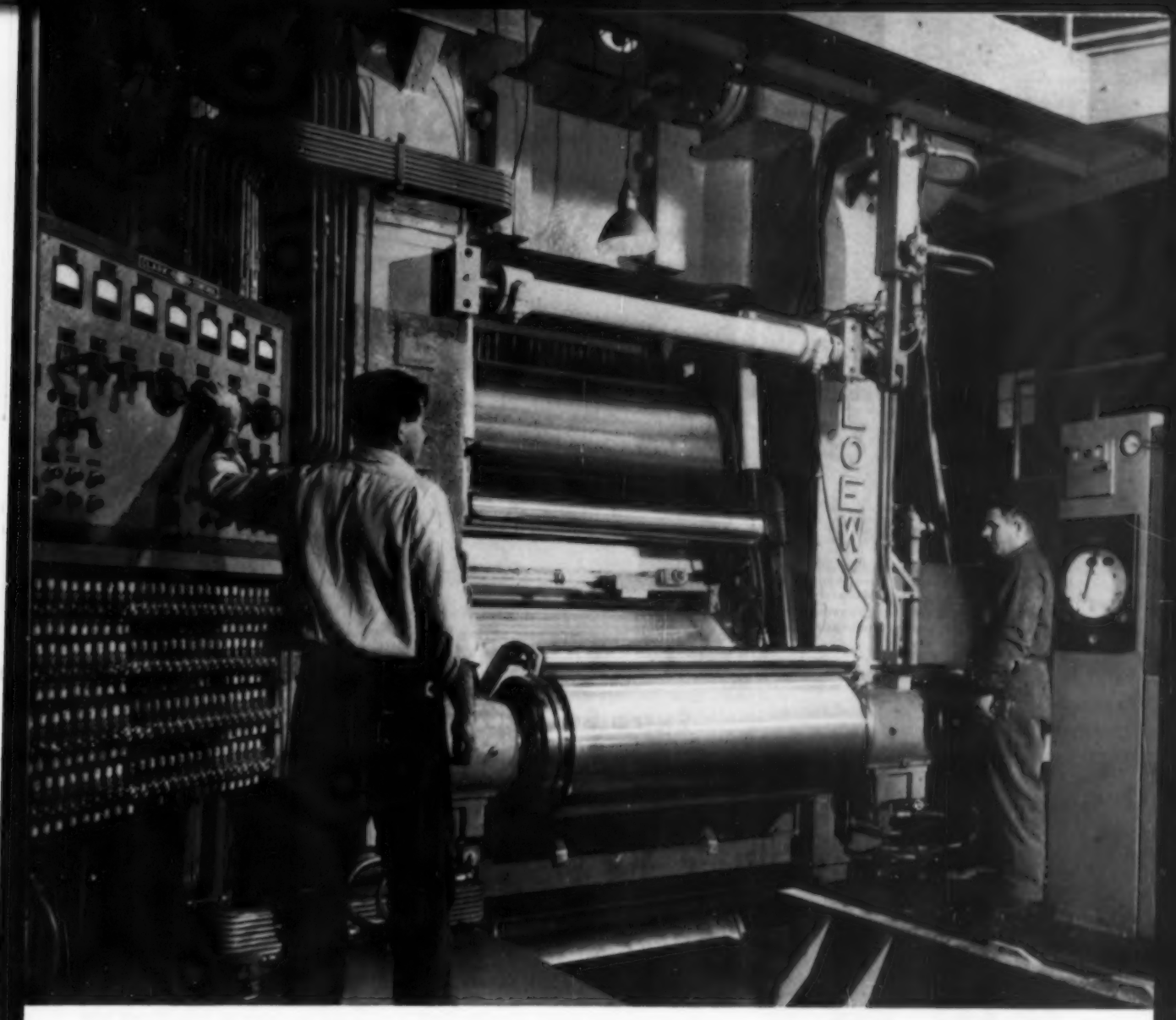
Cambridge Brass & Copper Co. Inc. has incorporated in Buffalo with capital of 200 shares. Principals are Emanuel Greenberg, Herbert M. Markham and Florence Katz, all of New York.

ASSOCIATIONS

H. C. Armstrong, president of Williams & Co., Pittsburgh, was elected president of the **Copper & Brass Warehouse Association Inc.**, Washington. Other officers are: G. D. Potter, Corey Steel Co., Cicero, Ill., vice president; Norman Rosow, New York Brass & Copper Co., New York, secretary; A. I. Gordon, Clifford Metal Sales Co., Providence, R.I., treasurer.

The Northern Ohio chapter of the **American Steel Warehouse Association**, Cleveland, elected William R. Holmes, Cleveland district manager of U. S. Supply Division of U. S. Steel Corp., president. Other officers are: W. H. Peterson, Republic Structural Iron Works, vice president; Harry McQuown, Solar Steel Corp., secretary-treasurer.

American Zinc Institute Inc., New York, re-elected these officers: President, F. S. Mulock, U. S. Smelting, Refining & Mining Co.,



Loewy-Hydropress foil mill reduces aluminum from .026" to .00025" at speeds up to 3000 fpm

At Kaiser Aluminum and Chemical Corporation's Permanente plant, this Loewy four-high 60-inch mill is producing foil up to 54 inches wide. This is the widest aluminum foil made in the west.

The Loewy mill reduces aluminum from .026" to .00025" in thickness, at speeds up to 3,000 fpm. Its installation increased plant rated capacity 50%—from 12 million to 18 million pounds per year.

Loewy can furnish you with high speed foil mills up to 72" or wider, to meet your requirements. In addition, we design, build and install blooming mills, continuous billet, sheet, bar and skelp mills, continuous strip mills, high-speed cold rolling sheet and strip mills, continuous merchant and wire-rod mills, rail and structural mills, and special mills. For illustrated bulletin L-102-A, write Dept. 146, Loewy-Hydropress Division, BLH Corporation, 350 Fifth Avenue, New York 1, New York.

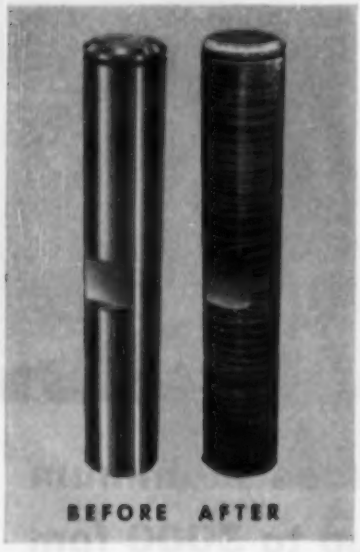
BALDWIN BLH LIMA-HAMILTON

LOEWY-HYDROPRESS
BALDWIN-LIMA-HAMILTON

DIVISIONS: Austin-Western • Eddystone • Hamilton • Electronics & Instrumentation • Lima • Madsen • Loewy-Hydropress • Pelton • Standard Steel Works

Case Studies: TESTING METHODS

Stresscoat is a Magnaflux developed brittle lacquer coating for testing and measuring stresses in working parts and designs. Stress analysis is providing new ways to reduce the cost and weight of products to make them stronger, better and cheaper.



Inspection with fluorescent Magnaglo under black light reveals cracks as glowing danger signals impossible to overlook. Magnaglo increases the speed of inspection and makes it easy to spot and identify defects in keyways, threads and other hard to see places.

"GOOD TURN" INSURANCE pays off for the Todd Shipyards Corp., Brooklyn, N. Y. A portable Magnaflux unit is used to inspect for cracks in keyed taper of an 18" propellor shaft of one of the giant ocean-going vessels.

Extra Savings in Both Manufacturing and Preventive Maintenance Inspection

M methods pay "extra" dividends when used to inspect the products you make. These testing methods help pinpoint early defects in forgings, weldments, castings, bar steel and other component parts in the "rough" or finished state. It enables you to take corrective steps to eliminate their cause in the production process. You save the time, money and materials usually lost by processing defective parts and excessive scrap. By clearly showing the extent and seriousness of defects, M methods provide added benefits from salvage operations.

A "safety" bonus can mean more than dollar savings in a preventive maintenance inspection program. Early detection of fatigue cracks in a crane hook can prevent an accident which could cost lives as well as money. Magnaflux offers many complete, easy, quick, portable methods for "in plant" or "in the field" inspection of machinery and equipment.

Consider for a moment, the many ways M test methods can help you save "extra" in your present operations. Consult your Magnaflux engineer for specific information and examples of how M can help you produce better for less!

"Conveyorized" Magnaflux inspection is engineered for jet engine production line. Jet engine vanes are inspected at the rate of 5,000 or more a day. First step is magnetizing vanes. Conveyor moves vanes into inspection booth (above) where inspector watches for any accumulation of magnetic particles indicating longitudinal defects. After passing through a second ferro-magnetic bath and longitudinal magnetic field, vanes are inspected for transverse defects. Then they move automatically through a de-magnetizer.

Write for complete details concerning any of the above case studies, (excerpts from MAGNAFACTS), or ask for our new booklet on Lower Manufacturing Costs.

Take Your Inspection Problems to the House of Answers . . .

MAGNAFLUX CORPORATION

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Boston; vice presidents, C. Merrill Chapin Jr., St. Joseph Lead Co., New York, R. G. Kenly, New Jersey Zinc Co., New York, and E. H. Snyder, Combined Metals Reduction Co., Salt Lake City, Utah; treasurer, Erle V. Daveler, American Zinc, Lead & Smelting Co., New York; executive vice president and secretary, J. L. Kimberley.

ANNIVERSARIES

Carpenter Steel Co.'s Webb Wire Division, New Brunswick, N. J., marked its 50th year in the manufacture of music wire, needle wire and stainless steel spring wire by surpassing all tonnage records last month. The division started operations on Mar. 20, 1906.

Wheeler Reflector Co., Boston, is celebrating its 75th anniversary. The firm is a leading manufacturer of fluorescent and incandescent lighting equipment and street lighting fixtures.

NEW ADDRESSES

Webber Engineering Corp. has a new address: P. O. Box 217, Indianapolis 6, Ind. The firm makes temperature cabinets.

Farrel-Birmingham Co. Inc., Ansonia, Conn., moved its Chicago office to larger quarters at 10725 S. Western Ave.

Office of the Detroit Technical Section, **International Nickel Co.'s** Development & Research Division, is now at 19842 James Couzens Highway, Detroit 35, Mich. F. J. Walls is in charge of the office.

Perolin Co. Inc., manufacturing chemists, moved its executive offices and headquarters for its Eastern Industrial, Marine and Export divisions to the Empire State Bldg., New York, N. Y. The firm's Western Industrial Division, which makes fuel oil additives and water treatment chemicals, will maintain its location at 1112 W. 37th St., Chciago 9, Ill.

YESTERDAY
TODAY
TOMORROW

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COMPLETE PLANTS designed, constructed, and equipped as an integrated unit for efficient and economical production.

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SPECIAL EQUIPMENT industrial furnaces, ovens, gas generators, and dryers—all fuels—field or shop erected.

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insures prompt service in planning and production by experienced engineers who know industry's problems. Our numerous sales and service centers keep in constant touch throughout all phases of the work.

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This booklet covers the scope of CONTINENTAL Service. It is well illustrated with views of CONTINENTAL installations with descriptions of the equipment and the processes performed.

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(Advertisement)

Why 371 U.S. manufacturers now enjoy 100% tax

Governor Muñoz tells why Puerto Rico offers such amazing incentives to new or expanding manufacturers.

"IN THIS statement, I shall try to explain Puerto Rico's economic position as frankly as I would to any manufacturer or labor leader who met me face to face.

Puerto Rico is currently making a determined effort to stand squarely on its own economic feet. At present we do not have nearly enough jobs to support our people. We are therefore directing every energy to create more jobs at home, and to curtail migration to the States.

That is precisely why we are going all out to attract every *new* plant we possibly can. But, to date, we are still providing only 25% of the new jobs we need *each year* to keep pace with our expanding labor force. I shall go into details later. But first I want to make two points of my Government's policy absolutely clear:

> **1. Puerto Rico has no intention of winning industries *away* from anywhere. We do not grant tax concessions to *runaway* plants.**
>
> **2. Puerto Rico's Industrial Development Plan is based on a combination of absolutely ethical incentives. We do *not* and *never will* hold out low wages as an attraction to business. My Government's firm philosophy is that wages should rise as rapidly as our economic development permits.**

Let me now describe our basic problem in more detail."

Our Problem

"When people talk of over-population as Puerto Rico's biggest headache, they certainly don't exaggerate.

Our unemployment is high. Our income level is still low—only 25% of the U. S. average. And every year 20,000 more workers swell our under-employed labor forces.

But this is probably putting the cart before the horse. Our real problem is not over-population but *under*-development. What then is our best solution?"

Our Solution

"I am convinced that the answer can only lie in more and more industry. Hence we are pinning our major hopes on our industrial development program, as the main pull of what we call Operation Bootstrap.

From the economic standpoint, Operation Bootstrap has but one simple aim—to develop industry, and in doing so, to encourage U. S. manufacturers to *expand* their operations to Puerto Rico. Operation Bootstrap is, in fact, a bold attempt to increase the well-being of our whole Commonwealth—workers and employers alike. And lest anyone should fear that my country's program might injure the U. S. economy, let me now sound a reassuring note:

> **1. The U. S. already has 65 *million* employed. Puerto Rico only needs to create 150 *thousand* new jobs to solve its present problem.**
>
> **2. One half of one percent of normal U. S. industrial *expansion* would achieve our whole economic program.**

I hope these comparisons help to put Puerto Rico's modest needs in proper perspective. But, for good measure, let me quote a few more figures to show how important a prosperous Puerto Rico is to U. S. business itself:

> **In 1955, Puerto Rico's purchases from the U. S. rose to $580,000,000. *Without* Puerto Rico as a customer, New York's gross sales would have dropped by $67,000,000; California's by $54,000,000; New England's by $53,000,000.**

So much for statistics. Now just a word about my people, without whose willing co-operation Operation Bootstrap would merely be a sterile dream."

Bootstrap Underway

"Pay us a visit and I think you will be impressed immediately by the wholehearted faith we Puerto Ricans place in Operation Bootstrap.

We believe in it deeply and thoroughly—and, with practically no exceptions, support its policies right along the line. Thus, I can promise the same eager, cheerful co-operation to every U. S. manufacturer who expands his industry to our Commonwealth.

Scarcely a month goes by that I am not visited by the Mayors of a dozen Puerto Rican towns, all asking for plants to be erected in *their* areas. There's not a community in all Puerto Rico that would not enthusiastically welcome the arrival of a new factory.

For we all realize that though we have made a promising start up the long, long hill to economic prosperity—the summit is not in sight yet. But the Puerto Rican people have squared up to their challenge and are meeting it in good heart."

in Puerto Rico freedom

Corporate Tax Exemption

If your net profit after U. S. Corporate Income Tax is :	Your net profit in Puerto Rico would be :
$ 29,500	$ 50,000
53,500	100,000
245,500	500,000
485,500	1,000,000

Dividend Tax Exemption*

If your income after U. S. Individual Income Tax is :	Your net income in Puerto Rico would be :
$ 7,760	$ 10,000
15,850	25,000
25,180	50,000
51,180	200,000

*Dividends are tax-free only if paid to residents of Puerto Rico by a tax-exempt corporation. Examples are based on Federal rates (Jan. 1, 1956) for single persons.

Beardsley Ruml tells how new or expanding industries (not runaway plants) get tax exemption.

"START A NEW plant in Puerto Rico and you are not only free from Federal income taxes (they don't apply) – you can be exempt from *local* income taxes too. Your freedom from Federal taxes is *not* a concession. It is a *Constitutional* fact which stems logically from that historic American principle 'Taxation without representation is tyranny.' Puerto Rico has no vote in Congress, and therefore no Federal income taxes – corporate or personal."

Protected by Two Constitutions

"Your business is not only protected by the Commonwealth Constitution, it is permanently guarded by all the guarantees of the U. S. Courts and Constitution, too.

As for your *local* income tax exemption, this is an *added* incentive, offered by the Commonwealth Government to attract new plants that Puerto Rico's economy needs so urgently."

How you gain from a new plant in Puerto Rico

1. A better return. Local tax concessions, freedom from Federal taxes, and lower operating costs will all reflect favorably in your company's balance sheet. See table above.

2. Abundant, skillful labor. Puerto Rico's labor force totals 644,000. The Commonwealth operates an ambitious vocational training program, which will even screen workers and teach them *specially* to operate your machines. The adeptness of the Puerto Rican worker in learning precision skills may be judged by the fact that the following famous companies now have operations in Puerto Rico:

General Electric (Trumbull Components Department). Remington Rand. St. Regis Paper. Beaunit Mills. International Latex. Carborundum Company. Shoe Corporation of America. United Tool and Drill. Sunbeam Electric. Univis Lens. Weston Electrical Instrument Company.

3. No currency or customs problems. Puerto Rico is a Commonwealth freely associated with the United States. It is an integral part of the U. S. economic system. You have none of the problems of operating from a foreign country. Movement of goods, money and people between Puerto Rico and the U. S. is as free as it is between the states of the Union. There's no duty on trade and the U. S. dollar is currency.

4. Low capital investment. New single-story, low-rental factories are ready to occupy. The government will even build a *special* one for you on a very small down payment. Abundant electricity, gas and water are just waiting to be connected.

5. Ideal location. Puerto Rico is served by 30 ocean lines and 8 airlines. It is only 5½ hours by air from New York – less than 4 from Miami. Goods are actually made in Puerto Rico one day and are delivered in Los Angeles the next. The climate is perpetual Spring. Temperature stays around the balmy 70's most of the year. Swimming, sailing and fishing are superb. Domestic help is plentiful.

Is Your Company Eligible?

To find out if your company is eligible for tax exemption in Puerto Rico, call our nearest office:

New York	MU 8-2960	579 5th Ave.
Chicago	AN 3-4887	79 W. Monroe
Los Angeles	WE 1-1225	5525 Wilshire

Or mail coupon for free booklet

Commonwealth of Puerto Rico
Economic Development Administration
579 Fifth Ave., New York 17, N.Y.
Dept. SM-61

Mail me "Facts for the Manufacturer," your report of the advantages of Puerto Rico for plant location.

Name _____

Company _____

Product _____

Address _____

Ingots...
you can reduce ingot cropping loss by 20 to 30% with Armstrong Ingot Insulation

Yield of usable steel ingot can be appreciably increased with Armstrong Ingot Insulation. Thrown in the "hot top" on top of the poured steel, these cork particles coated with special clays prevent deep pipe penetration of the ingot as the molten steel cools. Chemical composition of the steel is unaffected and there is no carbon pickup. If you would like to test Armstrong Ingot Insulation in your plant, call your nearest Armstrong office.

For a free booklet on the entire line of Armstrong Insulating Refractories, write Armstrong Cork Company, 2805 Reed Ave., Lancaster, Penna. For expert assistance with any refractory problem, call in your Armstrong engineer.

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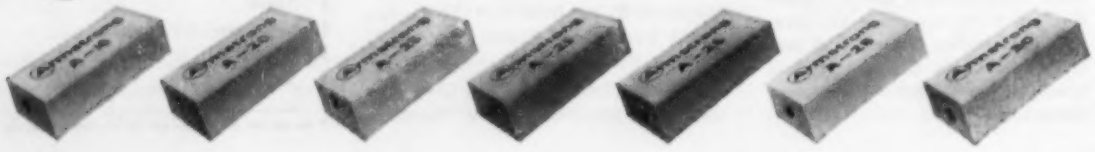


STEEL

May 7, 1956

Technical Outlook

NO HANDS—A new, 100-ft-long, 84-station segmented transfer unit machines, washes and air tests 103 auto oil pump bodies an hour. A part distribution system then feeds the finish-machined and tested parts to one of three precision boring machines, according to individual machine demand. The transfer machine was built by Snyder Tool & Engineering Co., Detroit.

EXPANDED MARKET— A growing use for expanded metal is conduit and cable trough. The light material (savings are 75 per cent over solid steel) increases circuit efficiency by draining away less current than solid conduit, says T. J. Cope Inc., makers of cable trough systems.

SAVES ZINC— The Bureau of Mines has developed a process to salvage skimmings which form on top of galvanizing tanks. Skimmings are leached with spent electrolyte and hydrochloric acid; the electrolyte is placed in an amalgam cell where the zinc is recovered electrolytically.

WIRE PROGRAM—Cutting and identifying wire for the F4D Skyray is five times faster with an automatic machine that measures, cuts, stamps and strips the ends. The maker, Douglas Aircraft Co., says that its top speed is 100 ft per minute and is accurate to ¼-in. in 100-ft lengths.

WINDS AS IT CARRIES—Steel Co. of Wales Ltd. soon will get a revolving ram truck that can carry coils weighing up to 70,000 lb. With additional counterweighting, capacity can be increased to 100,000 lb. Automatic Transportation Co., Chicago, says it's the largest unit ever built. The motorized revolving load ram winds the loose end of coils as they are in transit. The truck is engineered for the later addition of an attachment to upend coils and stack them vertically.

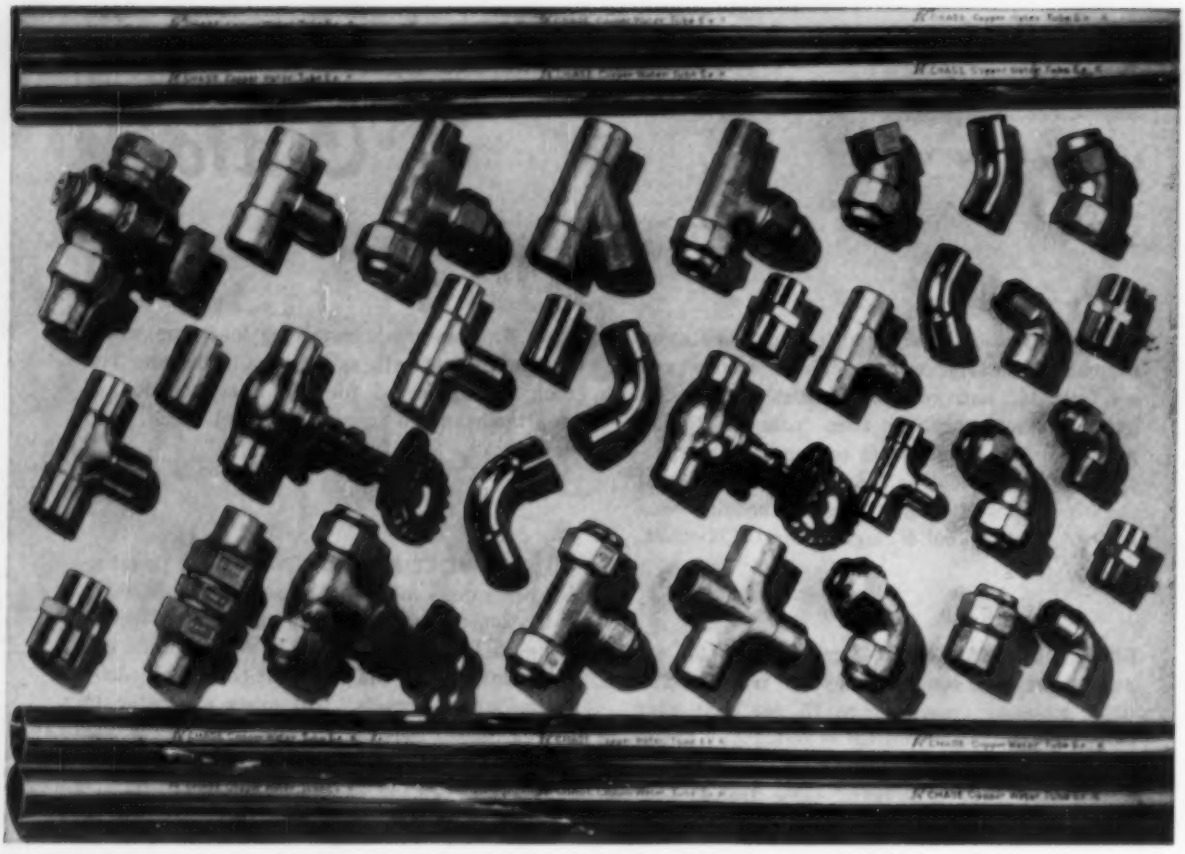
MILLION VOLT X-RAY— Two Van de Graaf x-ray generators will check heavy-duty weldments and atomic reactor vessels made by Chicago Bridge & Iron Co. A 1-million-volt machine will be mounted at the end of a 43-ft boom, will easily fit inside test vessels. The other generator (2 million volts) will penetrate 10-in. steel and needs only 1 minute to expose a film under 5 in. of steel.

PLATING TEST— A new test paper moistened with buffer solution shows up pores on tin, nickel and chromium plate. It also indicates pinholes in enamel and picks up minute rust spots on stainless steel. The product is made by R. P. Cargille Laboratories Inc., New York.

WEIGH METAL— An electronic device for automatic weighing on a conveyor system uses a spring of Ni-Span C, a nickel-chromium-titanium-iron alloy which is said to maintain its modulus of elasticity without variation over a 200° F span. The "Electro-Way" requires no temperature compensating system.

RADIOACTIVE SLEUTH— Tools accidentally left in jet planes are a serious hazard. McDonnell Aircraft Corp., St. Louis, has found a solution: It puts a small piece of radioactive material (cesium 137) in each tool. The tools are safe to use, but are easily located by a scintillometer or Geiger counter.

Metalworking Outlook—p. 47 *Market Outlook—p. 143*



Tubes and fittings—a major use of copper. Here are sweat or soldered fittings, flared fittings and fittings for automotive and refrigeration tubes

How To Choose the Right Copper

Prepared in co-operation with the Copper & Brass Research Association, this article discusses coppers which are commercially available and their engineering properties

ABOUT 20 distinct coppers are commercially available to meet specific engineering requirements. Adding small amounts of certain elements to native copper brings about some surprising property changes.

Adding a metal usually reduces conductivity. Silver is an exception; adding 25 oz of silver to a ton of copper raises annealing temperature by 200 to 300°F but has no significant effect on conductivity. Small amounts of antimony, cadmium, selenium, tellurium or arsenic also raise annealing temperatures slightly.

Deoxidizers—Other elements will remove copper's oxygen. Phosphorus and silicon in small amounts are effective deoxidizers. Zinc is excellent for this purpose; it also improves some physical properties of native copper. But as little as 2-per-cent zinc will reduce conductivity about 25 per cent.

By contrast, boron, also an excellent deoxidizer only slightly soluble in copper, has little effect on conductivity. Cadmium hardens and strengthens copper with only a slight effect on conductivity, but is not an efficient deoxidizer.

Commercial Grades — Coppers can be divided into three broad groups:

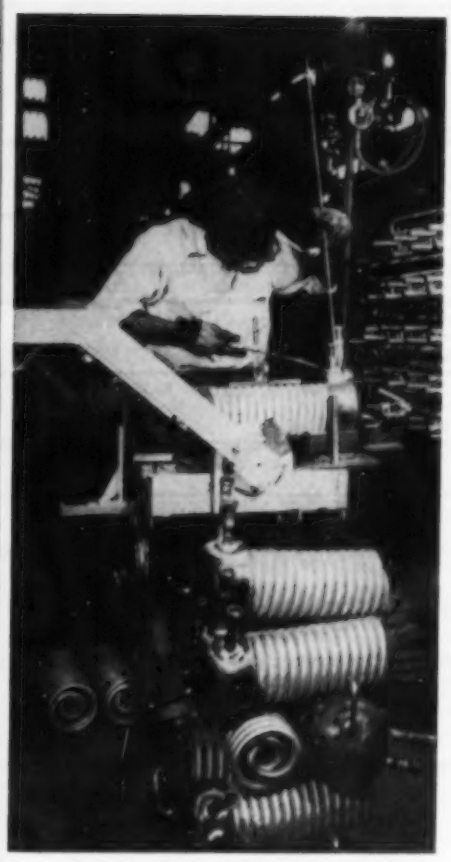
1. Those containing controlled amounts of oxygen in the form of cuprous oxide. Copper having between 0.02 and 0.05-per-cent oxygen is called tough pitch.

2. Those having no cuprous oxide. They may be further divided into metallic deoxidized types and oxygen-free coppers produced by controlling the melt.

3. Those coppers whose physical properties have been modified by adding small quantities of other elements.

Tough Pitch Coppers

Electrolytic tough pitch (99.9-per-cent copper, 0.04-per-cent oxygen) is the standard copper for



Brazing copper tube to head of condenser for use in refrigeration system. Typical shapes of copper refrigeration coils are shown

making wire, rod, plate, sheet and strip. It is the most widely used of the coppers. Oxygen does not lower strength or conductivity, but does reduce ductility in thin-section material.

Electrical conductivity of this general-purpose copper is 101-per-cent IACS (International Annealed Copper Standard) annealed. Machinability is 20 (free-cutting brass is 100). Furnished as cakes, billets and wire bars for hot and cold working, it is used for such widely divergent applications as bus bars, commutators in electric motors, auto radiators, sheet metal for building (see STEEL, Feb. 13, p. 132), radio parts, die-pressed forgings and equipment for the process industries.

Fire-refined tough pitch has a composition of 99.88-per-cent copper, 0.04-per-cent oxygen, plus traces of arsenic, bismuth, selenium, antimony, lead and nickel. Further refining to eliminate these elements and obtain the same nominal composition as electrolytic results in a grade called "fire-refined, high - conductivity," tough - pitch copper.

Silver-bearing copper (99.9-per-cent copper, 0.04-per-cent oxygen, silver by agreement—usually 8 to 30 oz per ton) is produced by adding silver to tough pitch, oxygen-free or deoxidized coppers. This grade also is the natural product of some ores found on the Michigan peninsula, sometimes referred to as Lake copper.

Silver content makes for excellent hot and cold working, a higher softening temperature than electrolytic copper, superior soldering and polishing qualities. It is used for commutators in electric motors, core and fin stock for radiators, tin dipping and heat conduction. Because it can be soldered in the hard condition without loss of strength, it can be used to advantage in certain equipment applications, such as radiators for internal combustion engines.

Adding silver to arsenical copper produces silver-bearing, arsenical, tough-pitch copper, a grade which has improved properties of both types.

Deoxidized Coppers

Deoxidized coppers are produced by introducing phosphorous or another element, like boron or lithium, as a deoxidizing agent. Phosphorus prevents any significant absorption of oxygen when this copper is hot worked, annealed, soldered, brazed or welded. A nominal composition of 99.9-per-cent copper (minimum) and 0.007-per-cent phosphorus has the highest thermal conductivity of the phosphorus coppers. It can be soldered and brazed into tube sheets easily.

High residual phosphorus copper retains 0.015 to 0.040-per-cent phosphorus, which is enough to decrease electrical conductivity appreciably. It is used mainly for nonelectrical applications such as fresh water piping, gas lines, condenser tubing, distilling equipment and sanitary drainage tubing. It can withstand a somewhat greater cold reduction than electrolytic tough pitch, and can be brazed or silver soldered in a gas flame.

Low residual phosphorus copper with 0.004 to 0.012-per-cent phosphorus has good conductivity, may be used for electrical conductors if phosphorous content is below 0.007-per-cent. Like the high-residual type, it is recommended when the metal is exposed to reducing gases at high temperature and for corrosion resistance to fresh water. Both types have better welding capacity than electrolytic copper.

Tellurium (0.6-per-cent), arsenic (0.15 to 0.50-per-cent) or silver (up to 30 oz per ton) may be added to phosphorized coppers to get special characteristics. Phosphorized arsenical copper is being used in some applications where brasses (Muntz metal or Admiralty) were

What Is Copper?

Coppers are classified commercially as electrolytic and fire-refined. *Electrolytic* is copper of any origin which has been refined by electrodeposition. *Fire-refined* is copper of any origin or grade which has been refined by furnace processes only.

Other terms refer to the method of casting or processing or to the origin of the ore. *Lake copper* is copper which comes from the Lake Superior district of Michigan. It is sometimes arsenical or silver bearing. *Tough pitch* is copper whose low oxygen content is controlled during melting and subsequent oxidizing. *Deoxidized* copper refers to the use of a metallic deoxidizer to remove any oxide. *Oxygen-free copper* is obtained by carefully controlled casting, but without adding a metallic deoxidizer. *High conductivity* copper can be expected to have a minimum conductivity in its annealed condition of 100-per-cent IACS.

used, because it has higher thermal conductivity.

Oxygen-Free Copper

This is not a deoxidized copper. Rather, the metal is cast in such a manner that oxides are avoided. It is melted, poured and cast in the presence of carbon or carbonaceous gases, so no oxygen is absorbed. This grade is superior to electrolytic tough pitch for certain special applications, and equal to it in electrical conductivity.

Oxygen-free copper is usually specified where a high-conductivity copper must withstand hydrogen atmospheres. It can be joined by hydrogen brazing, making it useful for electronic applications. Another application: Electrical equipment for service at elevated temperatures in the presence of reducing gases. Because copper oxide clings more firmly to the surface of oxygen-free copper than phosphorized or electrolytic, it is widely used for metal-to-glass sealing.

Superior ductility is an outstanding characteristic of oxygen-free copper. It can be more severely cold worked and deep drawn than tough pitch and is recommended for special stamping uses, such as impact extrusion, or for severe spinning. With the addition of silver (20 to 30 oz per ton) it is being specified for rotor coils of large motors. The addition of 0.005 to 0.01-per-cent phosphorus prevents embrittlement during arc welding, and has practically no effect on physical properties.

Modified Coppers

The Copper & Brass Research Association makes a distinction between commercially pure coppers, modified coppers and copper-base alloys. Modified coppers are those for which the specified minimum copper content—silver being counted as copper—is less than 99.88 per cent and more than 99.3 per cent. Above 99.88 per cent it is a commercially pure copper; below 99.3 per cent it is a copper-base alloy.

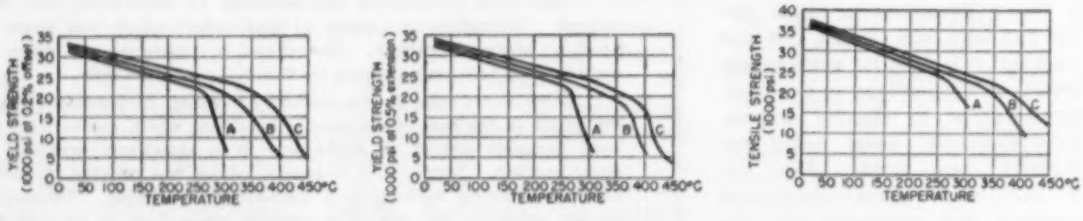
Tellurium-bearing copper (99.5-per-cent copper, 0.04-per-cent oxygen, 0.5-per-cent tellurium) has good conductivity, can be forged readily, machined or hot and cold worked. It may be rolled, with care, if casting is sound. Tellurium increases the ease of machining (machinability rating is 80 to 90); it almost has superseded leaded copper as a free-cutting copper.

This grade is furnished as rods, bars, die-pressed forgings, drawn bars and wires for plumbing, heating, refrigeration and air-condi-

Composition, Properties

Name	Composition (per cent)	Machinability (a)	Standard Forms (b)
Electrolytic tough pitch	Cu 99.9+	20	F, W, R
Phosphorized	Cu 99.9+, P 0.02	20	F, W, R, T, S, D
Boron deoxidized	Cu 99.98, B 0.02	20	F, W, R
Silver bearing	Cu 99.9, Ag 10-15 oz per ton of Cu (0.034-0.051 Ag)	20	F, W, R, T, S, D
Silver bearing	Cu 99.9, Ag 25-30 oz per ton of Cu (0.085-0.102 Ag)	20	F, W, R, T, S, D
Phosphorized arsenical	Cu 99.68, P 0.02, As 0.30	20	T
Tellurium	Cu 99.50, Te 0.50	80	R, D
Oxygen free	Cu 99.92	20	F, R, W, T, S

F—Flat Products; W—Wire; R—Rods, Bars; T—Tubes; S—Extruded Shapes; D—Die Pressed Forgings
*Form for which properties are given: Sheet 0.040-in. thick, rod 1 in. in diameter, wire 0.080-in. in diameter, tube 1 in. in diameter with 0.065-in. wall thickness



Influence of silver on tensile properties of high-conductivity copper at elevated temperatures. A—Silver content normal. B—Silver 8.7-oz per ton. C—Silver 28 oz per ton. Tests were made on cold rolled copper strips 0.050-in. thick

and Application Data

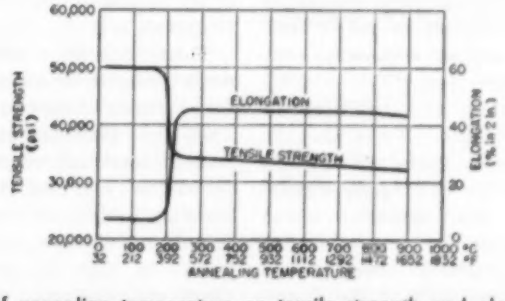
Tensile Strength (psi) Soft	Hard	Applications
33,000 32,000 35,000	46,000 (F)* 45,000 (R) 66,000 (W)	Bus bars, commutators, radiators, radio parts, sheet metal for building
35,000	45,000 (T)	Water piping, gas lines, condenser tubing, distilling equipment, sanitary drainage tubing
32,000	45,000 (R)	Plumbing, refrigeration, oil lines
33,000	46,000 (F)	Commutators, radiators, tin dipping, heat conduction
33,000	46,000 (F)	(Same as above)
35,000	45,000 (T)	Condensers, heat exchanger tubes and plates
32,000	45,000 (R)	Plumbing, heating, refrigeration and air conditioning, soldering tips
32,000 32,000 35,000 32,000 32,000	57,000 (F) 55,000 (R) 66,000 (W) 55,000 (T) 40,000 (S)	Electronics, high temperature electrical parts, metal-to-glass sealing, rotor coils for large motors (with silver added)

(a) Relative values are given in comparison with Free Cutting Brass-271 which equals 100
(b) Drawn or rolled special shapes can be produced from most copper
Note: The values given are to be considered only as a general guide and variations in properties due to manufacturing variables must be expected

tioning applications. Because it has excellent thermal conductivity and "tins" more readily than other metals, tellurium-bearing copper has been used as a soldering-pencil tip. The tip heats to 600°F in 90 seconds.

Machinability and corrosion resistance make this type useful for screw machine parts. Selenium (0.6-per-cent) sometimes replaces tellurium when a free-machining copper is needed. Mechanical properties and conductivity are not affected significantly. Much domestic tellurium-bearing copper is supplied in the oxygen-free grade.

Arsenical copper may be produced by adding arsenic to tough pitch copper, or it may occur in the ore. Arsenic (0.15 to 0.50-per-cent) raises softening temperature, materially increases tensile strength and further enhances copper's resistance to certain types of corrosion. Electrical conductivity is lowered. Arsenical copper resists flaking at higher temperatures than electrolytic tough pitch, a property that is used to advantage in condenser tubes, heat exchanger tubes and radiators.



Effect of annealing temperature on tensile strength and elongation of high-conductivity copper. Tests were made on 0.051-in. gage strip rolled from 0.080-in. gage after annealing at 300°C

Cadmium copper (99-per-cent copper, 1-per-cent cadmium), has markedly improved physical and mechanical properties. The addition of cadmium has no serious effect on electrical or thermal conductivity. Chief uses have been in resistance welding electrodes and trolley wires.

Chromium copper (99.05-per-cent copper, 0.85-per-cent chromium, 0.01-per-cent maximum of other elements) is somewhat different from most other coppers in that it can be precipitation hardened and heat treated to considerably higher strengths. Most coppers can be hardened only by cold working (full hard has twice the tensile strength of soft). But by suitable treatment, chromium copper can reach a tensile strength of 72,000 psi and a hardness of 77 Rockwell B, compared with electrolytic tough pitch values of 48,000 psi and 50 Rockwell B. Chromium copper generally is used for resistance welding electrodes.

Cost—In general, the cost of coppers with additives is determined by the value of the element to be added and the labor charge to make the addition. This premium is usually nominal and well worth the extra advantages gained in particular applications.

High or low residual phosphorus deoxidized coppers may be expected to cost the same, since the relative amount of deoxidizer used in either case is insignificant. However, oxygen-free coppers, because of the controlled melting process required in their production, cost somewhat more than deoxidized coppers.

The area of copper's uses is broad. And the presence of certain elements in small controlled quantities extends its applications still further. Specific problems of copper users should be taken up with the technical and engineering advisory groups maintained by copper suppliers and fabricators.

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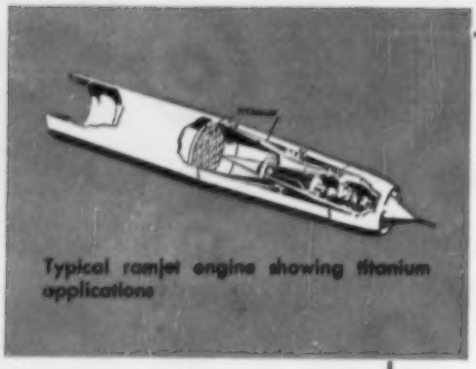
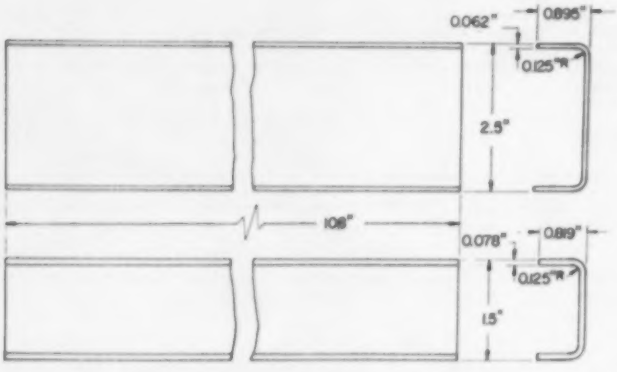


Typical ramjet engine showing titanium applications

Here's how one of the leading fabricators takes the magic out of this tricky metal. Some of its newer alloys must be formed at 1150° F



Hot forming reduces scrap. These channels were formed hot, eliminating the scrap caused by cracks from room temperature forming

How To Draw Titanium

THE "how to" part of forming magnesium, zirconium and titanium is an old story for Brooks & Perkins Inc. Now the company is stepping up the production of formed titanium. Volume is low, but this is outweighed by the variety of parts and the difficulty of the shapes.

Application: Aircraft parts for jet engines, boxes and covers for miscellaneous gear, areas exposed to elevated temperatures, pressure vessels and parts for strong, lightweight assemblies.

Here is what they say is the state of the art:

First—Brooks & Perkins' first titanium stamping was a severe radius cup, 2¾-in. in diameter and 1-in. deep. It was drawn in a single operation from 0.040-in. stock.

Rapid heating, single operation forming and rapid cooling give the required shape with a minimum exposure to air. The thin oxide coating can be blasted or pickled. The budget wouldn't permit experimenting with cold forming, but Brooks & Perkins soon found out that reduced scrap is a benefit of hot forming.

Drawability—How deep can you draw titanium? Brooks & Perkins formed a cup 3-in. in diameter by 5-in. deep out of 55,000 psi titanium. None of the examples of formed titanium parts illustrated exceed the severity of this draw.

At present, there is a demand for the latest high strength alloys. Pure titanium can be formed in the 600 to 800°F range; the alloys require up to 1150°F.

Method—Commercially pure titanium can be hot formed by the rubber-pad (Guerin) process. Rubber deteriorates above 500°F so the process is not economical at higher temperatures.

Pure titanium can be worked easily by spinning. Tools should be made of steel. Parts are formed best by a roller tool between 600 and 800° F. Alloy titanium can't be spun, they say.

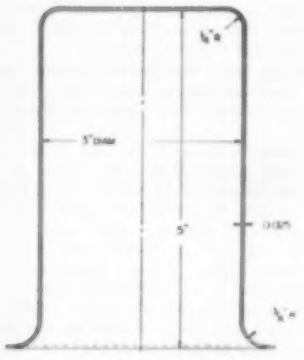
Rem-Cru A-110-AT has excellent weldability. One of the illustrations shows a jet engine assembly that is formed in three parts and welded into a complete circle. The parts are formed on cast iron dies at 900°F.

Needs — All titanium work at Brooks & Perkins is done on hydraulic presses equipped with hydraulic cushions. The right size press (180 to 750 tons) is matched to each job. No attempt has yet been made to determine the maximum speed of the ram. The objective has been the highest quantity with the lowest scrap.

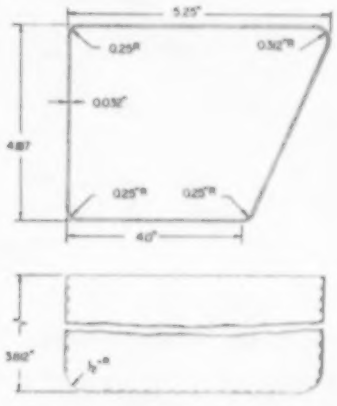
Dies—Materials for dies can be cast iron, hot or cold rolled steel or forging plate. Remember to increase the size of the die sections to accommodate loads at the warm temperatures.

There is still a great deal of work to be done on die materials for forming titanium at 900 to 1100°F. Experimenters should bear in mind that die materials exposed to elevated temperatures for long periods of time react differently than forging tools exposed to high temperatures for short periods.

Several heating methods are used. Titanium is excellent to use in the electric resistance method.



This test cup was the first attempt by Brooks & Perkins to plumb the deepest draw. None of the other examples exceed these requirements



This is a cover for a jet engine accessory case. Notice the extremely sharp corner

Cartridge heaters in the dies are successful. Gas burner rings for small runs are often used.

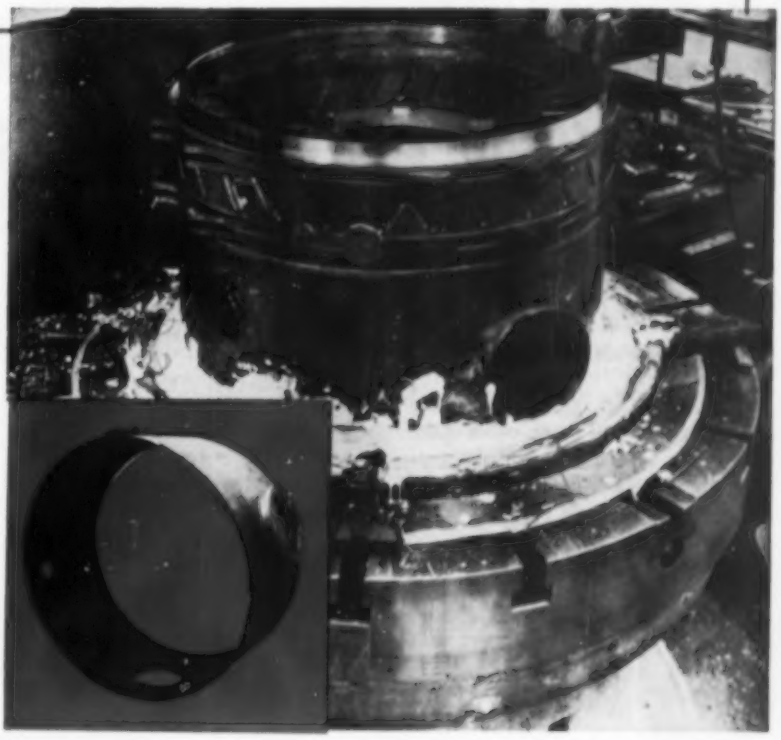
Heat control is about the same for titanium as for other hot operations. Hand pyrometers and Tempilstiks are adequate.

Relief—Like other metals that are severely worked or welded, residual stresses should be relieved. When titanium is worked at elevated temperatures, fewer stresses are developed. Even so, highly stressed parts must be relieved.

Titanium is stress-relieved in a vacuum furnace at 1000 to 1150°F for one hour. Avoid temperatures above 1200°F. Such temperatures form beta structures in titanium. During the service life, beta crystals decompose. Result: Serious embrittlement.

Lubrication—Experience is necessary for each job. In general, normal lubricants are satisfactory for forming at room temperature. For spinning and stretching at elevated temperatures, graphited tallow, or yellow laundry soap is adequate. Above 500°F there are only two stable compounds: Colloidal graphite and molybdenum disulfide.

These lubricants may be used in colloidal form with an evaporating vehicle or sprinkled on the die as a powder.



Jet engine parts are getting more complicated. The inset shows the complex forming of the side member before it is welded and machined into the main assembly

Final Operations—Cutting, turning, drilling, tapping and similar machine and finishing operations will offer no problems if current practices are followed. Blanking and piercing dies work well on hot formed titanium. Preliminary laboratory tests indicate that there will be little or no notch failure.

Brooks & Perkins says that you won't have any more difficulty with final operations on titanium than on stainless and high alloy steels.

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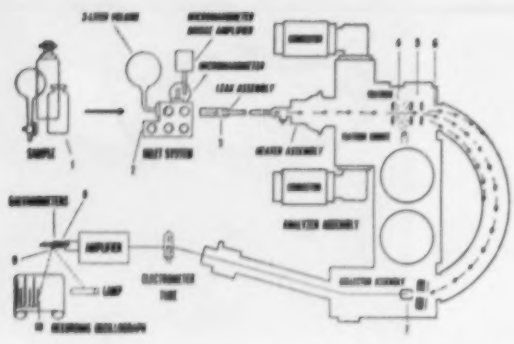


How the Mass Spectrometer Works

1. A sample of the unknown substance is stored in a small container at relatively low pressures, usually in the vapor phase
2. The molecules are introduced through a series of special valves called the inlet system
3. The conglomerate mixture of molecules passes through a restriction called a gold leak. The tiny openings allow only a limited number of molecules to pass
4. In the ionization chamber, called the Isotron, a much higher vacuum is maintained. Here the molecules are bombarded with a stream of electrons from a heated filament. Some become positively charged ions, others are fragmented and positively charged
5. Ions thus formed leave the Isotron chamber through a narrow slit. They are next accelerated to a high velocity by a strong electrostatic field, and pass through a second slit
6. A magnetic field, parallel to the slits, diverts the fast-moving ions into circular paths, the radius of which is proportional to the mass and velocity of the ion. The single beam is split into individual beams
7. Sorted in this manner, ions of a given mass pass through resolving slits and strike a collector 180 degrees away from their starting point. Charges given up to the collector are amplified by an electrometer tube
8. Having been translated into an electric signal, the results are amplified and fed to a bank of five galvanometers, each set for a different sensitivity
9. A tiny beam of light reflected from each galvanometer mirror is photographed on a moving roll of sensitive paper in the oscillograph
10. The complete mass spectrum is obtained, focusing the separated ion beams successively on the collector by varying the ion-accelerating voltage. As each beam sweeps across the collector, its intensity is recorded on the moving paper

Vacuum Melting: The Inside Story

By STANLEY A. DAWKINS
Applications Engineer
Consolidated Electrodynamics Corp.
Pasadena, Calif.

THE GAS that comes from a vacuum furnace will tell the story of what is going on inside—if you have a means of reading it. A major producer of vacuum melted metals reads it with a mass spectrometer.

The record of the gases drawn off during initial pump-down and melting, and during the subsequent reducing stage, tells exactly when these processes have reached their end points. A longer purification period than necessary might produce a change in alloy content through evaporation of volatile metals. It also would cost more.

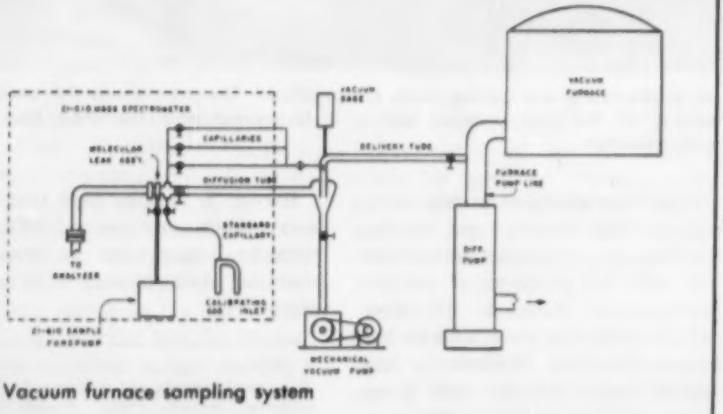
Adapted—The company is using a Type 20-610 Process Monitor Mass Spectrometer made by Consolidated Electrodynamics Corp., Pasadena, Calif. Its standard sampling inlet system was made for atmospheric pressures, so it was necessary to design a system for continuous sampling and analysis of gases in the 5 micron to 50 millimeter range (see illustration).

The sample is drawn from the furnace through a delivery tube by a mechanical vacuum pump. For furnace pressures above 1000 microns, a capillary tube is used to introduce the sample into the spectrometer. It restricts the flow and causes sufficient pressure drop from its inlet point to give an outlet pressure of 1000 microns.

At pressures of 1000 microns or less, a diffusion tube is used to introduce the sample. The sample forepump is not used when the diffusion tube is employed.

Quick Answers—It takes less than 15 seconds for the gas sample to move through this inlet system, even when gas pressures are so low that the pumps must be shut off to prevent back diffusion of oil vapor. Then the sample passes into the spectrometer entirely by diffusion.

Experience has shown that hand operation of valves to shift from one inlet method to the other as the pressure drops gives satisfactory results. However, the system could be operated automatically.



Vacuum furnace sampling system

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Straddle carriers are used for movement

Fork-lift trucks load and unload material on bolsters

More Movement, Less Investment, More Profit

Such expressions as "the best handling is no handling" and "lower costs by reduced handling" reflect current thinking. But they're all wrong for some situations

By F. C. WIER
Superintendent of Materials Handling
Timken Roller Bearing Co.
Canton, O.

THESE RULES can bring about an over-all reduction in the manufacturing cost of a product, particularly in the movement and storage of alloy bars and tubes in a steel mill:

1. More handling rather than less. 2. Sometimes moving the greater distance rather than the shorter. 3. Disregarding handling costs (to a small degree).

Why—Steel mills and the buildings which house them are expensive. Shifting production requirements to meet customer demands is costly; any change in the flow of materials from that of the original planning and layout of the plant results in bottlenecks which reduce production.

More flexible methods of material handling and a different engineering approach are needed.

Outside Storage — Handling methods must be cheap enough, flexible enough and positive enough to allow all congested material to be moved outside buildings to inexpensive storage. The ratio of building storage costs to outside storage costs is $12.50 a square foot to 10 cents a square foot, or 125 to 1.

Such methods require constant re-evaluation of the congestion situation. Engineering of movement is needed. An almost limitless number of factors constantly change movement and storage requirements.

Combined Functions—Engineering the movement and storage of materials and the procurement of equipment and its maintenance can be done only by having these functions combined in one department—preferably a material handling department. Moving and storage are carried on by the same people. Through charts and a two-way radio system, they are constantly re-engineering the complex pattern of free movement.

The physical methods used for movement and storage can be any type which will provide loading, hauling, unloading and storage—and do it cheaply, easily and conveniently, with unhampered flexibility. There must be a depth of hauling and loading equipment, either on hand or quickly procurable, which will preclude any possible chance of failure to supply materials as needed.

Straddle Carriers—At Timken, 35,000-lb-capacity straddle carriers are used for movement. Equipped with pneumatic tires and powered by gasoline or diesel engines, they are driven through the rear wheels and have four-wheel power steering.

The carrier runs over a load (straddles), engages its load

The HUB of Alloy Steel Production is the home of OHIO FERRO-ALLOYS

We think it might be an item of interest to all our customers to know that Ohio Ferro-Alloys Corporation was conceived almost a third of a century ago in the minds of men who were busy making Canton, Ohio the world's largest producer of fine alloy steels.

Out of their success came the capital which launched our corporation. But more important than all came the precious "on the scene, day by day experience" which now enables us to chart our course with confidence.

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We gladly share with you, all our ferro-alloy customers, the advantages we enjoy in living next door to the world's greatest alloy steel laboratory . . . the laboratory of practical experience.

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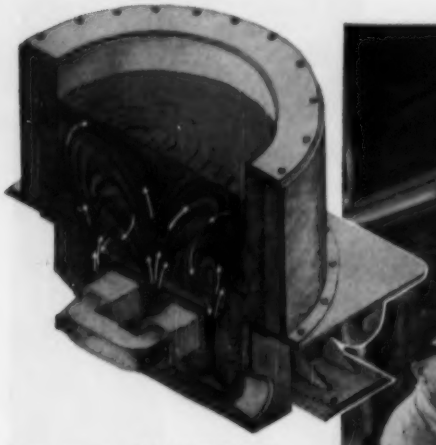
HARD-TO-MELT BRONZES SUCCESSFULLY HANDLED

in

AJAX INDUCTION FURNACES

Brass and bronze foundries all over the country have found AJAX-TAMA-WYATT induction furnaces a reliable tool for melting silicon bronzes, aluminum bronzes, leaded bronzes, phosphor bronzes, and other high strength alloys. Operation is highly economical due to the good uniformity of the alloys, low ratio of rejects, drastic reduction of metal losses, and clean operating conditions. This recent development opens the field for the use of AJAX induction furnaces in all foundries where difficult-to-melt alloys are handled.



Cross section of AJAX-TAMA-WYATT twin coil induction furnace such as used at the *Torrance Brass Foundry*. Heat is produced within the molten metal in the secondary channels and conveyed throughout the melt by electromagnetic circulation, resulting in minimum metal losses and high uniformity of alloy. Temperature is automatically controlled.

Baseball Fans—Do you recognize this man? He is Rocky Bridges, Cincinnati Redleg infielder, keeping in condition during the Winter season at Torrance Brass Foundry, Torrance, Cal.

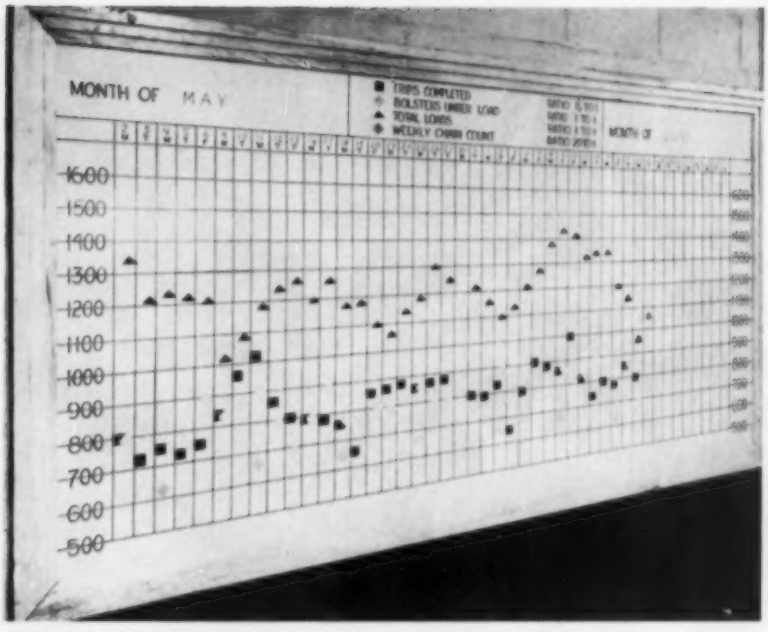
(Photograph courtesy of Long Beach Press-Telegram, Long Beach, Cal.)

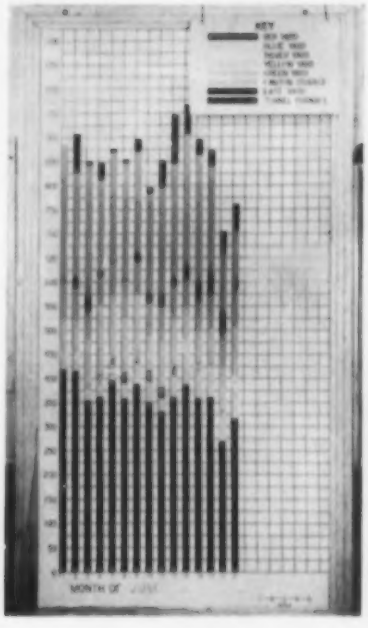
The furnace pictured above is melting aluminum bronze at the *Torrance Brass Foundry, Torrance, Cal.*, operating at a temperature of 2400 F, for the production of high strength centrifugal castings. This unit is rated 100 kw. Note also the clean, smokeless operation as shown in the unretouched photograph.

AJAX **AJAX ENGINEERING CORP., TRENTON 7, N. J.**

INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting





These two charts tells the story of what to unload and when to unload it. The chart at left shows the relationship between the number of loaded bolsters in the laydown yards at the start of the day turn and the number of trips during the same 24-hour period. The second chart is a detailed breakdown of bolsters under load in storage yards

hooks, lifts, carries it to its destination, lowers it to the ground, runs off it and is on its way for another load without assistance. All carriers are equipped with two-way radios.

Fork Trucks—Lift trucks of 20,000-lb capacity on pneumatic tires do loading and unloading in the yards. They are powered by gasoline or diesel engines and have power steering. Some have two-way radios. Loads are picked up on the forks or on a variety of apparatus (on the forks). They permit handling with bundling chains, roller tables or other devices. Changes are made in seconds by inserting the forks of the truck into the sleeve apparatus.

Advantages — Both types of equipment are self-loading and unloading; they do not require hook-up men; they are flexible, simple and efficient; nothing is required for unlimited expansion of the service except more roads and more laydown areas.

Laydown Areas—Some of the things necessary in laydown storage areas are:

1. Superior housekeeping.

2. Organized laydown patterns with identifying signs which can be easily read at day or night. (At Timken straddle carrier operators are guided by steel cables supported between steel posts. Small metal discs attached to the cables identify the storage spot. Each spot holds one load. The people who process the materials next are given the storage location. To move a load to the succeeding operation, the dispatcher radios the location key to the carrier operator who delivers whatever is occupying the indicated space.)

3. Slag or rubble base for surface (so that rain will not affect working conditions).

4. Adequate drainage. (Storage yards are made with heavy rubble or furnace slag 18 to 24 in. thick. This is topped off with fine grade slag or stone. Catch basins provide good drainage, so hauling traffic can be carried on without regard to weather conditions. Occasional scraping and addition of surface material are needed.)

5. Flood lighting of the storage yards. (This is necessary for efficient night work. Lights on vehicles are not adequate to insure safe, fast movement. In steel mill work, requirements are the same on all turns. Flashlights provide stronger light for reading heat numbers on steel.)

Operation — Material to be moved is loaded on steel racks called bolsters, which give the straddle carriers a method of lifting and carrying. Load hooks on the carrier positively engage the bolster. We have found that 1600 bolsters are adequate for the movement of as many as 1500 loads per 24-hour day. This means we must unload and reload as many as 600 bolsters in a week. Bolsters are used for storage to the degree that is feasible.

Charts—Data are gathered each morning by foremen and combined with information on production scheduled in the mills on the laydown and movement charts, which indicate what the situation will be during the coming day and the next day.

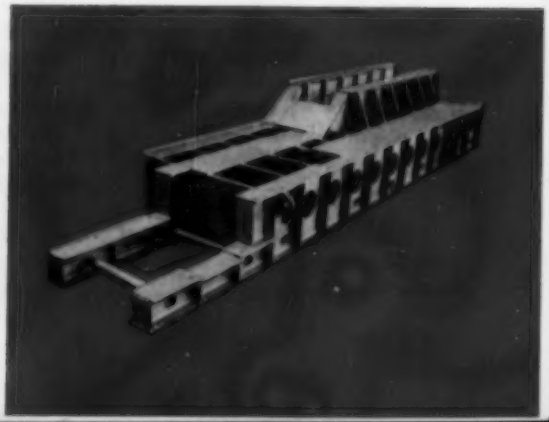
Two 4 x 8-ft charts tell the general story of what to unload and when to unload it. They are mounted on the wall of the office which serves the supervisors of the material handling department. The setup makes the information available to all supervisors and straddle carrier operators.

One chart shows the relationship between the number of loaded bolsters in the laydown yards at the start of the day turn and the

CONTINENTAL high-speed 21"x53"x60", 4-stand tandem cold mill in the Gibraltar Plant of the McLouth Steel Corporation.

CASTINGS—carbon and alloy steel castings from 20 to 250,000 pounds.

WELDMENTS—fabricated steel plate, or cast-weld design.



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In the Gibraltar Plant of McLouth Steel, this modern CONTINENTAL 60-inch, 4-stand tandem cold mill rolls steel at delivery speeds in excess of 3,000 fpm.

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50th Anniversary
BLAW-KNOX
1906-1956

Cables strung between steel posts enable operators to lay down their loads in an orderly pattern. The small metal disc on the cable identifies the storage spot

number of trips during the same 24-hour period. It does not give specific data—merely a generalization of the total situation. The two symbols establish a pattern. This pattern, plus other production data, forms the background for decisions.

Load Breakdown — The second chart is a detailed breakdown of bolsters under load in the storage yards. When it becomes necessary to unload bolsters, this information directs attention to a particular yard or yards.

Storage trends are indicated for each yard. When the total is too high, this chart will indicate the area which needs to be relieved. The material handling department is responsible for knowing where this unloaded material is and also for reloading it onto bolsters for delivery to the operating units as they ask for it.

Piling—Long material which must be unloaded from bolsters (to provide bolsters for additional steel) is piled. The extra handling is inexpensive and is preferred to investing in additional bolsters which cost from $75 to $135 each.

Various sizes are placed on the same pile. The choice is relative to the time of next processing. The location of this piled steel is the responsibility of the handling department until it is loaded onto a bolster again. Delivery of material stored on bolsters to operating departments takes about 10 minutes; the same order, if not on bolsters, is nearly an hour away from the operating department.

For Success—For a system like this to be successful, it must provide all machinery with the material needed for maximum production. Certain attitudes must be adopted by the people who have the moving to do. They must remember that:

1. The handling department is strictly a service function.
2. It must render service to such a point that the people being served get what they think they should have.
3. Any challenge of production policies by the service department must be indirect. The service must always stay subservient to the manufacturing process.

Two-Way Radio — Communications by two-way radio are essential to this operation:

1. They are more accurate than the written word because they are "read back" to the dispatcher.
2. Verbal orders cannot be filed, lost, thrown away or put at the bottom of the pile. They can only be carried out as given and are a great aid to the rapid production of a handling system.

There is no particular need to keep written records to establish which department might be responsible for a wrong movement. Because movement does not change the material (only its location), a human error is not beyond repair.

Equipment Pool—Straddle carriers are operated under a pool system, while large lift trucks are generally on an assigned basis. The pool system is best. Fewer spare carriers are needed to allow maintenance of equipment. Peak movement requirements are resolved which otherwise would shut down some operations.

Pooling and directing equipment to serve multiple requirements is somewhat similar to raising a figure to the second, third or higher power. The greater the number of points to be served and the larger the pool, the larger the profits — as long as proper verbal communications are available to all points of origin and all pieces of equipment.

Goal—The movement needed in any operation is that which keeps all production equipment operating at top capacity for the least overall cost. A small amount of movement during a peak of congestion will cure a bad situation.

To cope with such situations, Timken maintains a "half-way yard." On a long haul it is halfway from the rolling mill to the finishing department. When the mill produces faster than the carriers can deliver the steel to its destination, the loads are placed here as a temporary way to speed up hauling. As soon as the peak is past, the haul is completed.

Maintenance—To carry on a system of movement and storage as flexible and rapid as we have described, it is essential to have equipment maintenance directly supervised by the same people who operate the handling system.

To do otherwise would require a much greater depth of equipment. Maintenance must be subservient to the operation, but it also must be well done.

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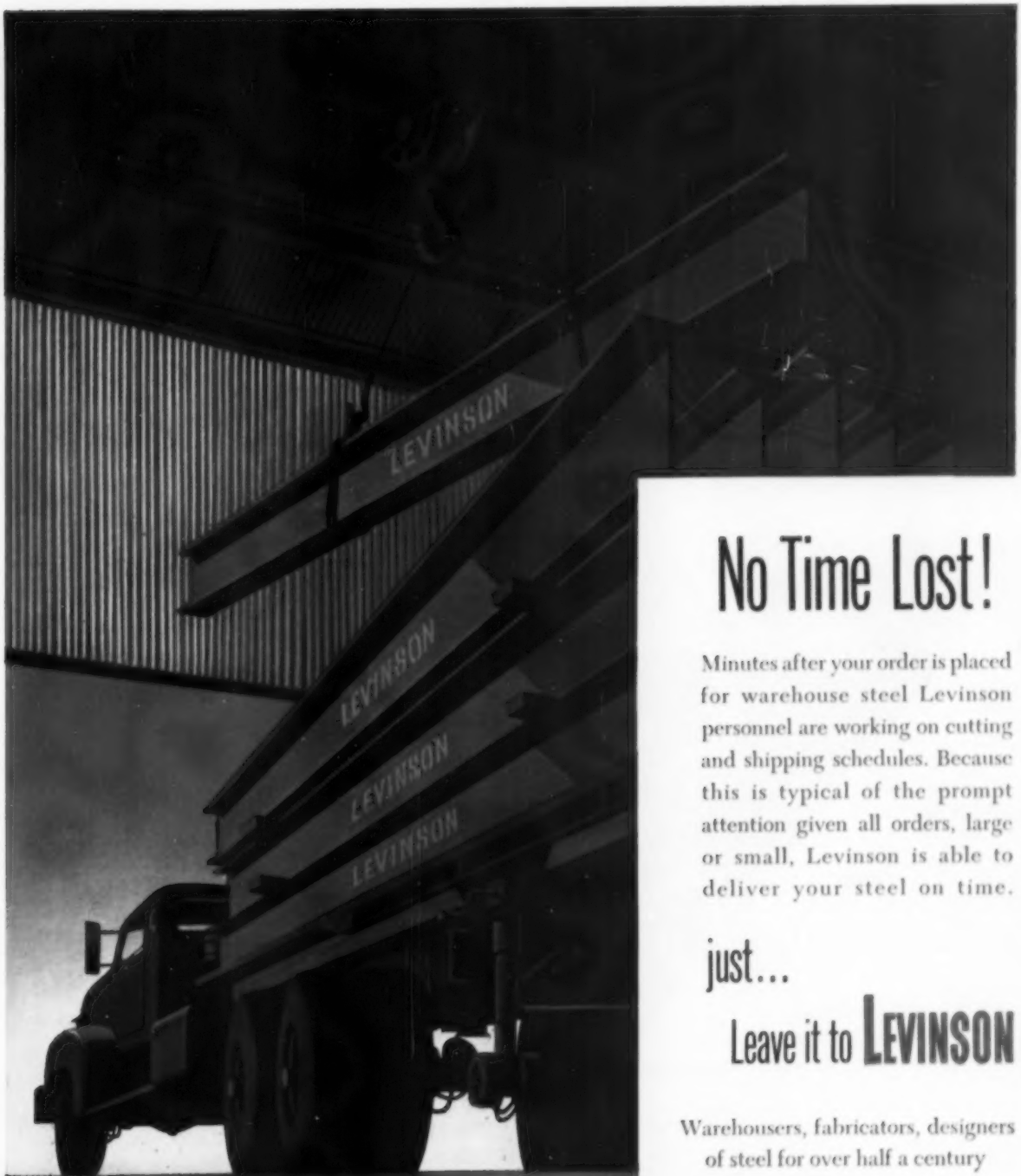

No Time Lost!

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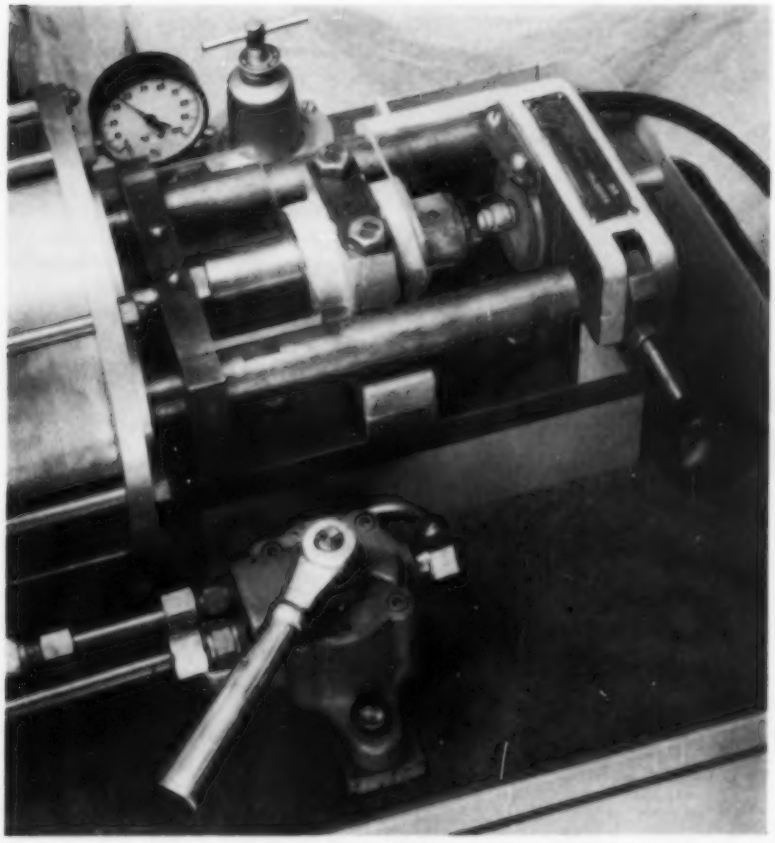
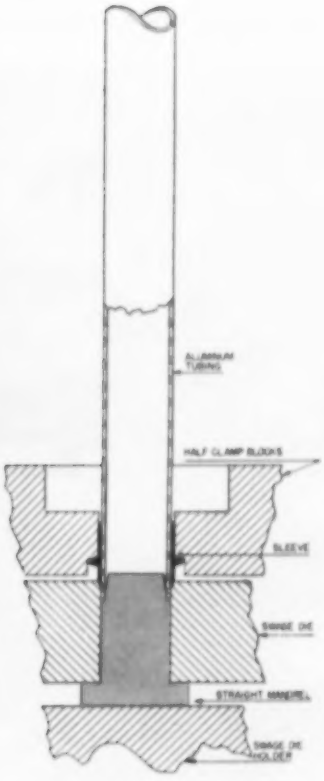




Air-operated sleeve presetter shown with the tube and sleeve in position for swaging. Preset sleeves enable formed tubes to be stored for production without loss of the nuts

Tighter Fits for Fittings

Flareless fittings are necessary in today's jet aircraft. Here are even more recent developments—a sleeve presetter and an approved shorter nut for cramped spaces

NUTS that take less room and an automatic sleeve presetter that insures a better, leakproof connection are doing their part in tomorrow's faster jet aircraft.

Higher pressures (some blueprints already specify 6000 psi) put far greater emphasis on leak protection than ever before.

Flareless Fittings—About 1950, the old-style flares gave way to the modern, flareless (Ermeto) type introduced by the Weatherhead Co., Cleveland. Because the sleeve forms its own seal in the tube surface, leaks are less frequent; it costs less to make because it eliminates the flare forming operation. Field replacements are more uniform — more like the original factory installation.

The latest development in the flareless-type fitting is the short nut used with a long sleeve. The tubing gets its support from the tail section of the sleeve rather than from the long nut. Advantage: Bends closer to the nut in limited space and tight corners.

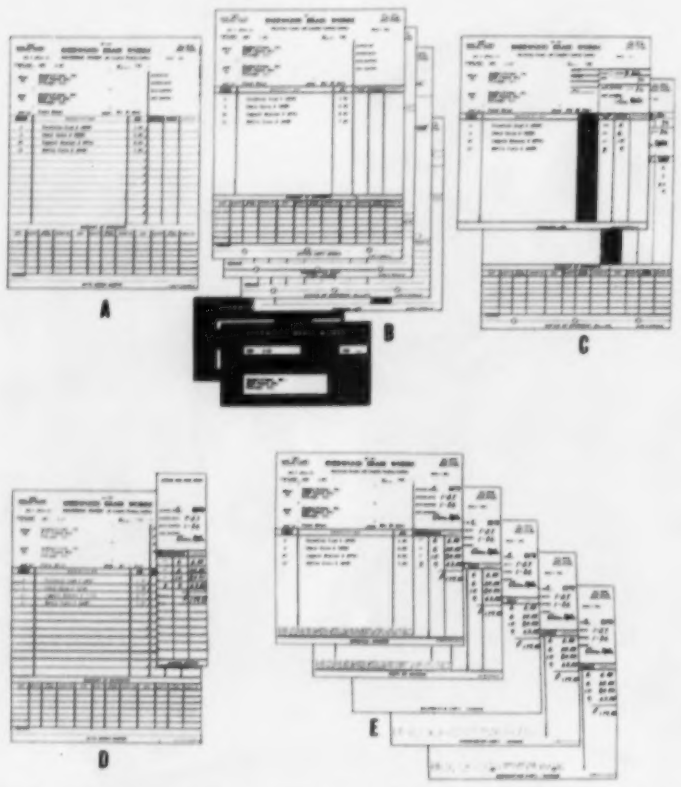
Presetter — For convenience, tubes are preassembled and preformed, complete with nuts and sleeve. Without a flare, however, the nuts and sleeves fall off. Some convenient method was needed to assemble the sleeves in the correct position and hold them on until assembled to the aircraft.

Chance - Vought Aircraft Inc., Dallas, developed its own presetter which swages the sleeve onto the tube in the correct position. Tube subassemblies can be stored near the production line. The assembler merely attaches it to the fitting and gives the nut the proper tightening or torque. Guesswork and disassembling for inspection are eliminated.

An air-powered presetter, composed mainly of presetting dies, a clamp and controls, is available from the Weatherhead Co., Aviation Division, Antwerp, O.

Accepted—The flareless, sleeve-type fitting, according to the producers, has better vibration resistance and provides a seal against high pressures that is superior to the old flare method.

A recent check shows that both Air Force and Navy have adopted the flareless method for hydraulic systems.



A—order master. B—order entry and shipping copies. C—completed shipping copies. D—order master with variable billing master. E—invoice copies

Duplicator Speeds Invoicing

AN ORDER-INVOICE system, which costs less than $1 a day to own and maintain, is saving Sherwood Brass Works, Detroit, more than $8000 a year.

The foundry has increased its sales 30 per cent in four years, but it has been able to handle the load without an increase in its clerical staff of 13. In some cases, paper-work time has been slashed from 8 to 2 hours.

Duplicator — Until 1952, Sherwood used snap-out forms for order and invoice writing, which meant three or four rewritings of each order.

Rewritings are eliminated in the present system. From a master order form (8½ x 11 in.), which includes all necessary information, copies are run off on a duplicating machine made by Ditto Inc., Chicago. These include production department copies, an office copy, shipping papers and packing list, billing notice and shipping labels.

Master — To make a master by the "Direct Process" system, a sheet of spirit carbon is placed face up behind a sheet of master paper, and the information typed or written on the paper. The carbon dye is picked up on the reverse side of the master.

On the duplicating machine, a small amount of the dye image is dissolved and transferred to the copy paper, forming the finished copy. As many as 300 copies can be produced this way.

Paper-Work Steps — When the foundry receives an order, it first is edited by a price clerk and an order master is typed. Copies are run off and distributed to the proper departments.

Shipping papers on each order are clipped together and held in the billing department. This provides customer service control in the office. When a shipment is ready, the shipping clerk enters all information that affects billing on the packing list. This information is transferred to the billing notice through spot carbon on the back of the packing list.

The clerk includes the packing slip with the goods, attaches the label to the package and returns the billing notice to the invoice department.

Billing Department — When the billing notice is received in the billing department, a clerk clips a variable master (2½ x 9 in.) to the right side of the original master. On this variable, she enters and extends the figures from the billing notice.

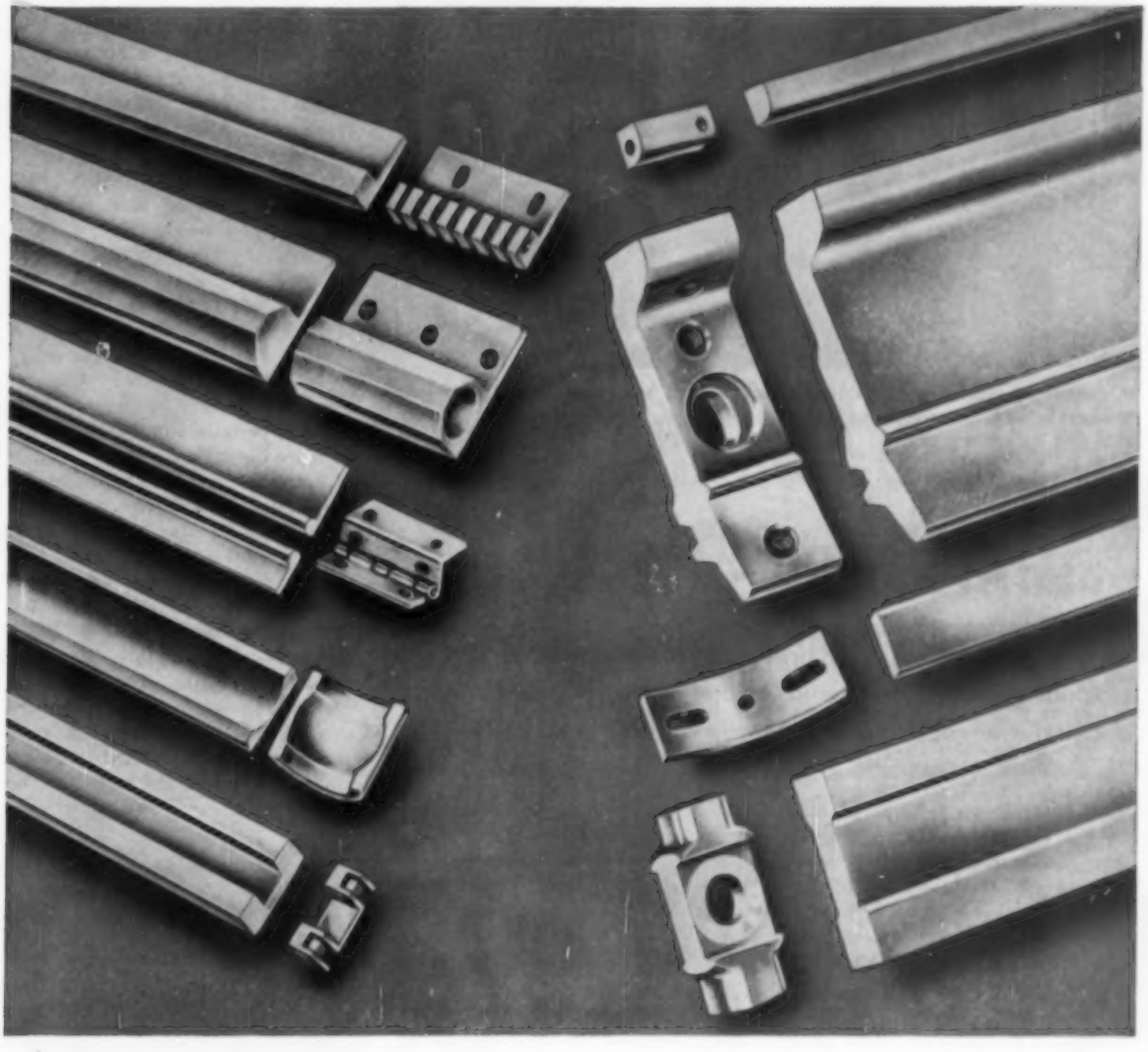
The original and variable masters are combined to duplicate an original invoice and accounting copy. Some 20 per cent of Sherwood's orders require at least one back-order shipment, which calls for an extra shipping set and invoice set.

With the Ditto system a variable billing master can produce a complete set of invoice copies in a minute, with all back-order papers complete and every figure in agreement.

Time Savings — To handle an average of 25 orders a day, the foundry uses the duplicating system for 20 minutes daily to produce order copies and another 20 minutes daily for invoicing. The duplicator also is used for 20 minutes to handle letters, forms, schedules, price lists, etc.

For the 1 hour a day that the machines are in use, the cost, including depreciation, maintenance and supplies, is 99 cents. Cost of production order sets is 13 cents each; invoice sets are 5 cents each.

A SHORT CUT TO A FINISHED PRODUCT



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get a superior wrought metal product with Anaconda extruded shapes

Cost-paring possibilities unlimited: In few areas can imagination and ingenuity pay off so handsomely as when applied to the use of extruded shapes. Visualize your finished parts as cross-sectional pieces cut from a long extruded shape.

Costs come down, quality goes up: Extruded metal is *wrought* metal—tough, dense-grained, smooth-surfaced, and easy to machine. When you switch from cast parts, you eliminate rejects due to pits and porosity; you reduce machining, scrap . . . and finishing time.

A manufacturer of hosiery knitting machines, for example, found he saved from 25-30% over cast brass. He makes 420 components from 12 different ANACONDA Extruded and Drawn Brass Shapes. He also gets the superior precision, balance, and long-wearing and bearing qualities in these parts, which must operate at high speeds.

Metals: Extruded shapes are available in copper, brass, bronze, and special copper alloys—in long mill lengths suitable for feeding into turret lathes or automatic screw machines.

Our experience at your service: The American Brass Company pioneered in extruded shapes. The accumulated experience of the organization, its wide selection of dies, may help you short-cut production and save money.

We'll be glad to make suggestions based on your sketch or sample. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

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EXTRUDED SHAPES

A completed side (two plates) was checked as a unit to insure perfect, continuous flatness. Dowels and tapered attaching bolts were marked before shipment to assist erectors

Supersonic Nozzle

The jet and rocket age brings in some odd and difficult machining jobs. Here's what happened when the Air Force decided it needed a 16-ft square, variable nozzle

MACHINING wind tunnel nozzles for the U. S. Air Force is a king-size job—especially when they have 16 x 57-ft sides made of flexible, tough, $\frac{3}{8}$-in. thick T-1 steel. One surface must be perfectly flat and smooth to prevent efficiency-reducing eddy currents.

The nozzle opening is 16-ft square. Two opposite sides can be curved inward to permit opening adjustments down to 12.5 x 16 ft. At supersonic speeds, wind pressure is tremendous. Great care in machining and construction is a must.

Construction—Each side of the nozzle was made with two plates. The two nonflexible sides were backed up with 16 box-type girders. The flexible sides were supported with jacking beams and motor-operated ball bearing screw jacks. Each jack was equipped with an indicator, so that the throat contour of the nozzle could be matched to the wind velocity.

Machining — Special, one-shot backing plates were used as stiffeners during machining. Specifications called for thicknesses within plus or minus 0.031-in., with variations not to exceed 0.003-in. per inch. Flatness lengthwise had to be within 0.019-in. Total variations could not be greater than 0.001-in. per 8 ft. The air-stream surface was finished to 60 microinches rms.

The fabricators, Baldwin-Lima-Hamilton Corp., Philadelphia, adapted several standard machines. In one case, a milling cutter and a belt grinder were added to a planer.

Checking—The box girders were checked for flatness, two at a time, side by side, to insure true flatness across the continuous surface. Joining bolt holes were then line reamed and fitted with taper-ground bolts; doweling holes were drilled and each piece match-marked before shipment.

All welds were checked twice by radiograph.

Each flexible plate was fitted along its moving edge with an air seal and an aluminum wear strip. (They slide across the roof and floor of the nozzle as the flexible plates are moved.)

Barrel Finishing

AUTOMATIC barrel finishing systems are the latest in automation. Called Supersheen by its makers, Almco Division, Queen Stove Works Inc., Albert Lea, Minn., the system loads, descales, degreases, grinds, deburrs, burnishes and rinses metal parts. Rust inhibitor also can be applied.

Parts—Automatic finishing can be applied to stampings, diecastings, machined, extruded and centerless ground parts. The cycle is controlled by preset switches or by an operator. A programming feature on one of the two types of systems permits elimination of one or more operations.

Automatic handling of the media prevents part-on-part impingement. Both the abrasive media and parts are unloaded onto a belt conveyor; parts are then separated from the media by a magnetic device or vibrating screen and passed through a drier before being assembled or stored. The media are raised to an overhead, rotary screen classifier. Different sizes of abrasives are routed to bins. Up to 10,000 lb an hour can be handled.

MERRY-GO-ROUND
. . . barrels parts to a high finish

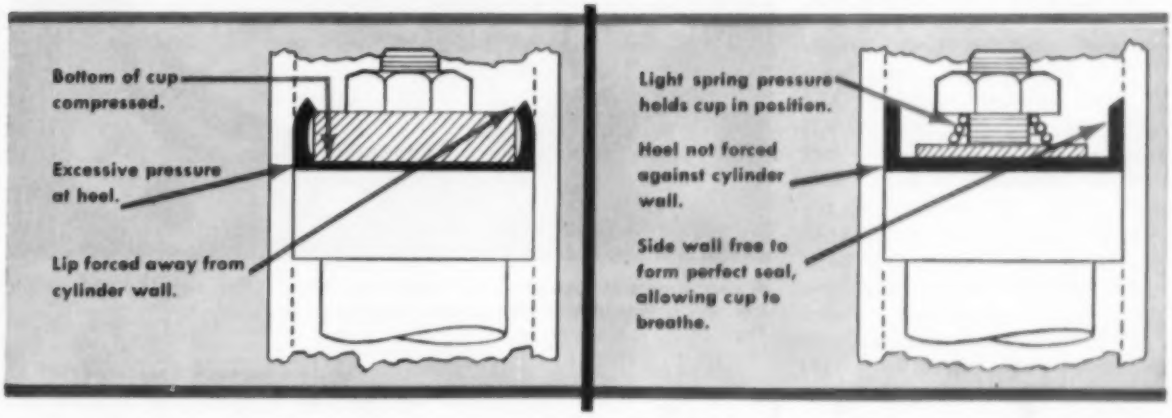
Index—The barrels move from one finishing tank to the other at the same time. If the programmer has been set to by pass one station, the barrel remains stationary until the next indexing. Programming is available only on the Skip-Station type.

The manufacturer claims that production is increased and finishing compounds are saved in comparison with standard barrel finishing practices.

ANOTHER
NEW DEVELOPMENT
IN PACKING DESIGN

SPRING MOUNTED CUPS

Provide Better Seal.....Reduce Friction


Bottom of cup compressed.
Excessive pressure at heel.
Lip forced away from cylinder wall.
Light spring pressure holds cup in position.
Heel not forced against cylinder wall.
Side wall free to form perfect seal, allowing cup to breathe.

Houghton hydraulic research has come up with one of the chief answers to the problem of excessive friction, short cup life and chatter so often encountered in cup packing installations. Now, instead of the squeezing action of bolting the cup packing in place between the piston and the follower plate, you can use a spring mounting with preformed cup packings. The illustrations show the obvious advantages.

This leadership in hydraulic know-how is typical of Houghton, which makes all types of hydraulic and pneumatic packings, as well as a complete line of hydraulic oils and fluids.

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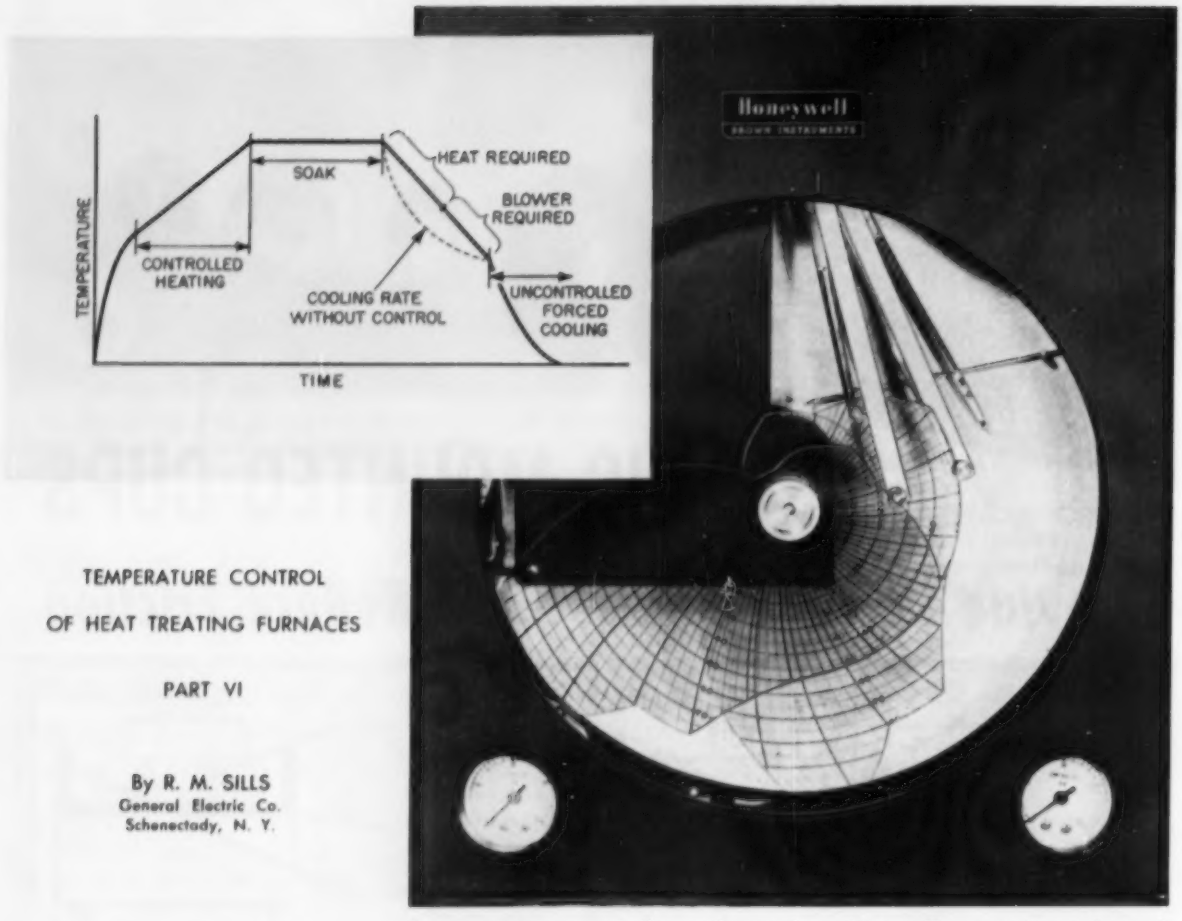


A cam program controller and recording charts. The superimposed graph indicates a typical time-temperature program

TEMPERATURE CONTROL

OF HEAT TREATING FURNACES

PART VI

By R. M. SILLS
General Electric Co.
Schenectady, N. Y.

Special Systems

SPECIAL furnace control systems are frequently necessary.

They do not replace the basic systems already discussed in a previous article (STEEL, Apr. 30, p. 112), but supplement them. Considered supervisory controls, they tell the working control what to do and when to do it.

Two-Point Control—A resistance (muffle or retort) between the thermocouple and the work reduces the temperature variation in the work. This method has two disadvantages: The furnace temperature cannot exceed the ultimate load temperature by more than a few degrees, eliminating the advantages of fast heating; the load temperature may vary with respect to the furnace temperature, and the load temperature will not be known exactly.

If the load temperature is controlled inside the retort or muffle, the overshoot, undershoot and furnace temperature may be excessive, especially with a massive load.

This dilemma is frequently solved by the use of two-point control. In this system, two temperature sensing devices and instruments are used, one for furnace temperature and the other for controlling load temperature. The two controls are connected in series; if either temperature exceeds the set point, power will be reduced.

Two-point control may be used with other forms of control. In such cases one of the two controllers usually operates as a two-position control. For example, proportional control would be operated by the load temperature sensing element. During the heating-up period, the furnace would be controlled by on-off until the load temperature reached its set point, after which the power would be controlled proportionally by the load temperature.

One disadvantage of two-position control is temperature overshoot. For this reason, it is used in heating massive loads, such as heavy coils of low carbon steel. The temperature sensing element

is located just outside the load but inside the retort or muffle.

Program Control—For accurately controlled heating and cooling rates and complicated time-temperature cycles, program control is used. It may be used with any of the control systems already described, and consists of a system for predetermining the rate of heating or cooling over a complete cycle.

In continuous furnaces, temperature programming is tied in with furnace design and production rate. It is accomplished by proper distribution of heat and maintenance of proper temperatures throughout the length of the furnace. On batch-type furnaces, programming consists in automatic resetting the control instrument to vary the temperature.

The two most common program controls: The cam type and the motor-operated front setter.

The cam type is used with circular chart controllers, the cam being cut to give the desired time-temperature cycle. The cam moves the set point through a mechanical or pneumatic follower. Benefits: Complexity (nonuniform heating and cooling rates) with a minimum of difficulty.

Front Setters—In the front setter system used with strip charts, an electric motor drive moves the index. The rate is controlled by controllers or interrupters. These timing devices, calibrated in degrees per hour, open and close the motor circuit at the desired rate. The program is a series of small steps.

This system is for linear rate change, although near nonlinear rates may be obtained through interrupters. Linear temperature change depends on a linear temperature measuring element, and for this reason it is not adaptable to instruments with radiation-type detectors, which are nonlinear. Its greatest advantage is quick change.

Cascade—With cascade control, one controller is used to adjust the set point of another.

One of the simplest examples is adjusting the set point of a flow controller, rather than controlling the valve directly. In direct control, any pressure change would affect the flow but could not be corrected until it had shown up as a temperature change. With the cascade system, pressure changes are corrected immediately by the flow controller.

A version of cascade control can be used with two-point control. Overshoot can be eliminated by cascading the two controllers, so that as the load temperature approaches its set point, the furnace temperature set point is reduced. If the proportioning is correct, maximum rate is obtained with no overshoot.

Cascade control will become more common as continuous processing speeds are increased. Here are some advantages:

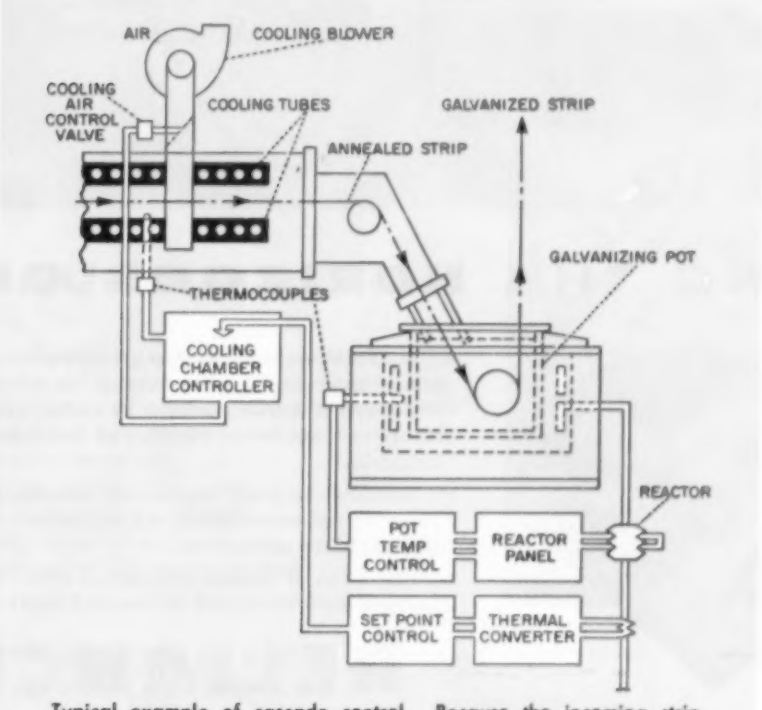
1. It will maintain a ratio between two variables. 2. It will limit the range of variation. 3. It reduces the effect of load changes. 4. It provides better control by reducing time lags.

A good example of cascade control in a continuous process is the strip galvanizing line.

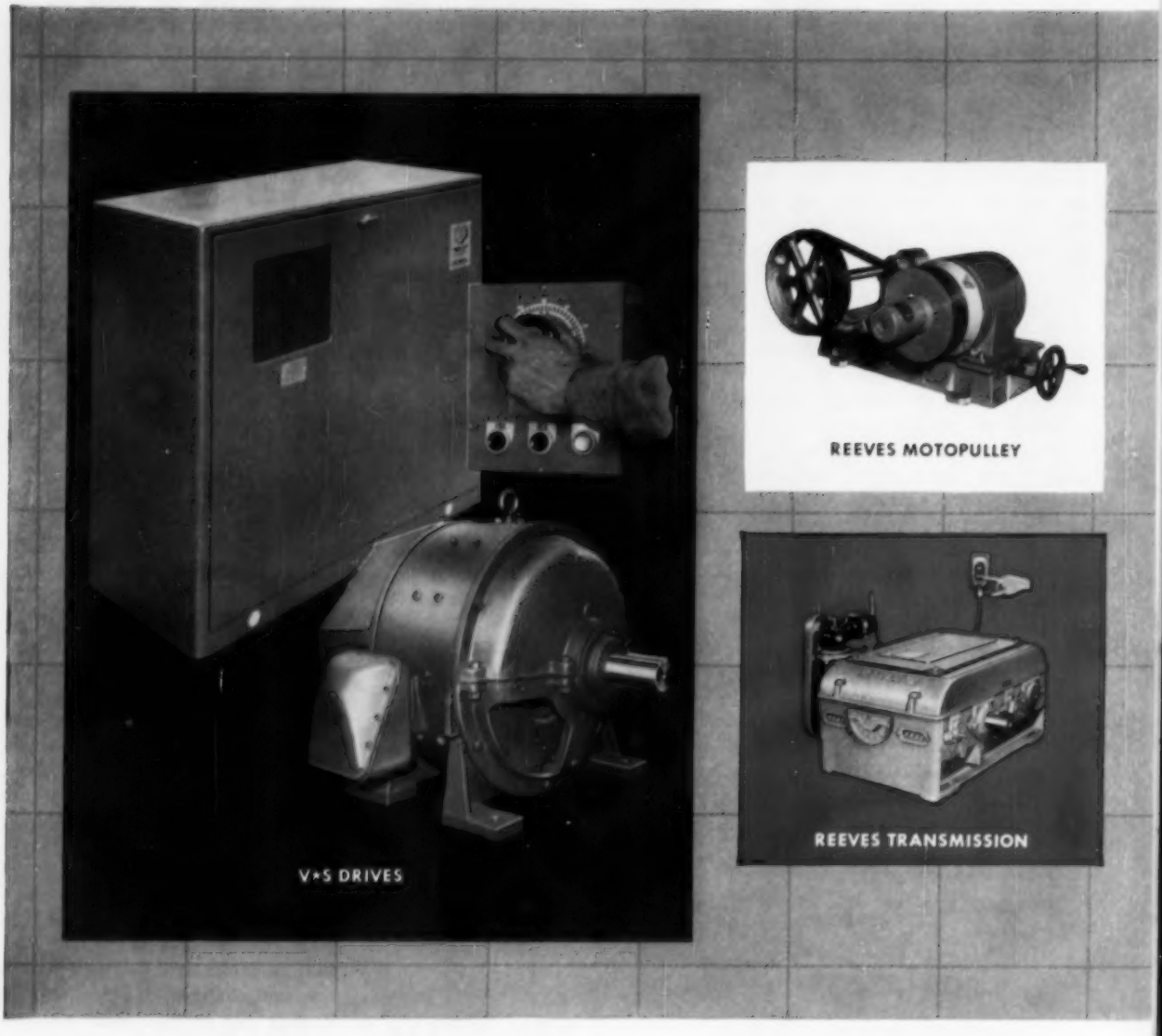
After annealing, the strip is slowly cooled to approximately the temperature of the molten zinc. Most of the heat for the pot is supplied by the ingoing strip, but a small amount is supplied by heating units around the pot, controlled by saturable reactors. If the speed or gage of the strip changes, the amount of heat that must be supplied external to the pot changes. Since this is limited, the external heat requirement may easily exceed the maximum rated input or become negative.

To keep within the range of the pot heating elements, it is necessary to adjust the temperature of the strip cooling chamber. This is inconvenient to do manually and may result in large variations in zinc temperature. To correct this, the control for the cooling chamber responds to changes in power input to the pot. Zinc temperature is controlled more accurately than if the pot controller had to do all the work.

Protection—Overheating can be minimized by proper control equipment, adequate inspection and maintenance. Overtemperature contacts do not provide protection



Typical example of cascade control. Because the incoming strip is hotter than the molten zinc, a cooling chamber is tied in with the molten zinc temperature control system



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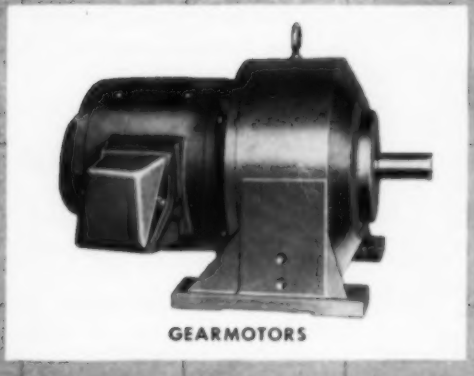

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Bulletin No. A-1555-B gives further details.

A-1519

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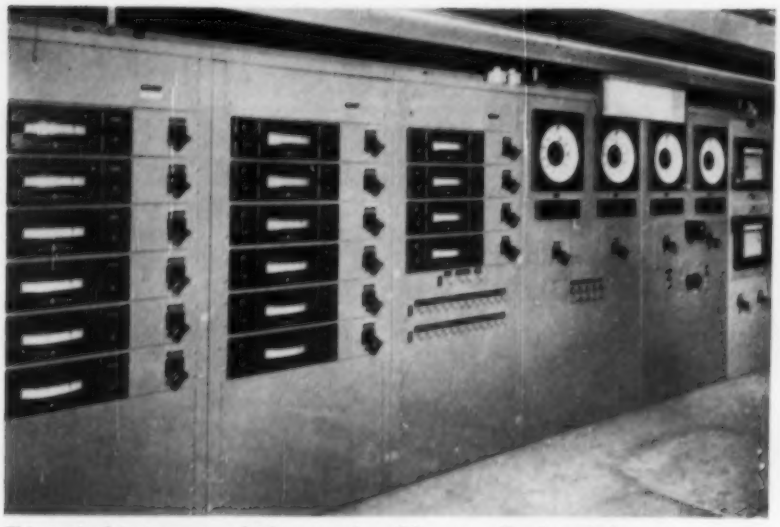


This typical instrument cubicle controls a 20-zone roller hearth furnace

against failure of the instrument. The best protection is a completely separate system.

Millivoltmeter pyrometers, operating from their own thermocouple, are the most common protectors. Where millivoltmeters are used for control, a multipoint recorder functions as a recorder and overtemperature protector.

Saturable reactors provide safe, independent protection when the overtemperature instruments are used to remove direct-current voltage.

Similarly, the gas safety shutoff valve may be used.

For electric furnaces, a circuit breaker tripped by the overtemperature instrument provides the best protection. At least one breaker for each furnace should be provided for overcurrent and short circuit protection.

Where continuity is important, two methods are available. A separate and duplicate control system can be adjusted to control at a slightly higher temperature. The two systems might be alternated each week as an additional precaution.

If the furnace is always attended, a simple alarm circuit can be used to warn the operator of overtemperature.

Fuel-Fired Protection—Gas and oil fired furnaces (except radiant-tube type) present a hazard that may be more serious than overheating—explosion. Such a situation may arise either through accidental extinguishing or having individual burner cocks open when the main gas valve is opened and before the burners are lighted manually. According to one authority, 50 per cent of gas furnace explosions occur during lighting off.

Combustion safeguards are devices used to detect presence of a flame. This may be done in several ways, including photocells, (for luminous flames) and flame electrodes (using either current conduction through the flame or rectification of current in the flame).

Here are some of the important requirements for gas-fired furnaces:

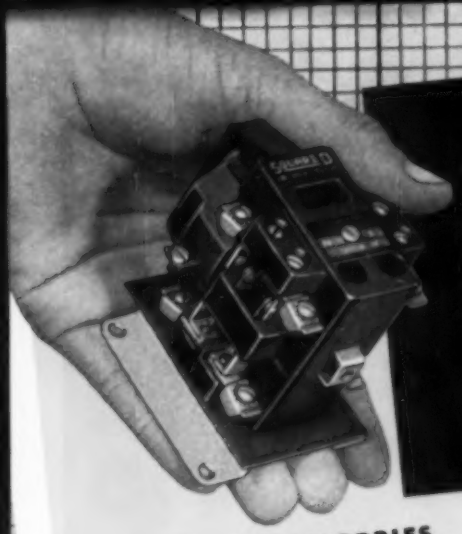
1. Close all burner cocks before opening main gas valve.
2. Install a fixed, premixed-type pilot for each burner, particularly on furnaces operated below 1400 F.
3. Provide ventilation before lighting off.
4. Interlock combustion air and fuel supply.
5. Use well designed mixers, preferably with a blower for combustion air.
6. Use combustion safeguards in event of pilot and/or main burner flame failure.

Complete safety recommendations may be obtained from Factory Mutual Engineering Division, 184 High St., Boston 10, Mass.

• This is the last in a series of six articles by the author. An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

Meet the Author

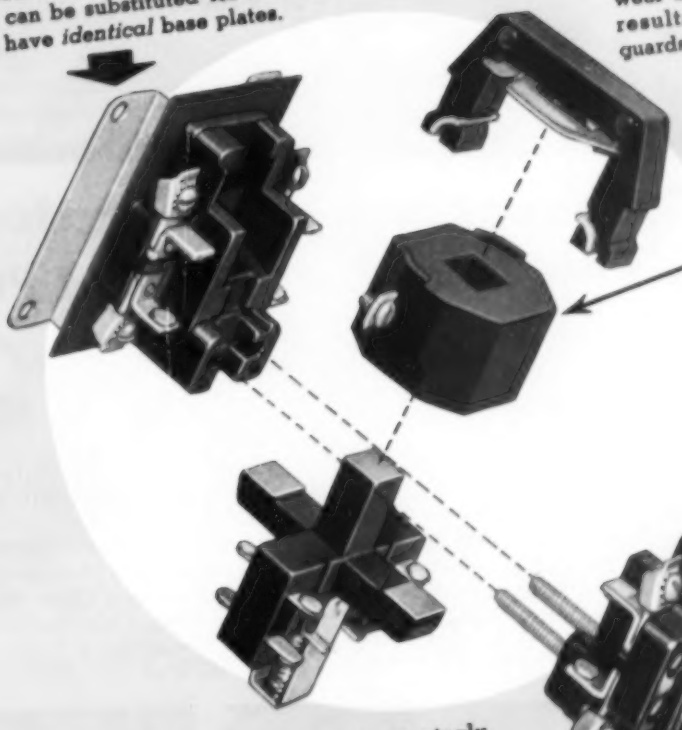
Mr. Sills is well qualified to write about industrial furnace controls. He was graduated from Yale in 1940 (B. E. in electrical engineering) and immediately went to work for General Electric. He designed furnace temperature controls until 1946, when he was transferred to the Industrial Heating Department as an application engineer for electric furnaces and controls. Currently, he is working on systems applications in the Steel Engineering Department.



this new, small size SQUARE D RELAY has features you'll like!

NO MOUNTING WORRIES
When more contacts are required, the 4-pole relay (DO-42) can be substituted for the 2-pole (DO-22). Both have *identical* base plates.

OUTSTANDING PERFORMANCE
Balanced construction reduces wear on single moving part... results in long life and safeguards against down time.



RESISTS DAMAGE
Plastic impregnated molded coil is unbreakable, operates cooler, is dimensionally stable and impenetrable by water and oil.

20-SECOND DISASSEMBLY
Simply loosen two screws and the entire device is disassembled for normal maintenance.

This new Class 8501 Type D relay is amazingly compact. 2-pole version measures only 3⅛" high x 2⅛" wide! 4-pole is only 3 1⅛" high x 2 1⅜" wide! Both rated 10 amperes, 600 volts. Packaged parts kits make normal maintenance easier than ever. Write for Bulletin 8501 which tells the complete story. Address Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin.

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Granite City saves fuel, raises production and quality with Cities Service Heat Prover!

Nation's 14th largest steel producer uses Heat Prover on soaking pits, open hearth furnaces and on their annealing furnaces.

Granite City Steel burns enough fuel in one year to heat a five-room house for 38,000 years!

Obviously, if this fuel burns inefficiently, the loss could be staggering. But Granite City has no worries on that score. "Thanks to the portable Cities Service Heat Prover, we get better fuel efficiency, better quality, greater production than ever," they report.

"Because it provides a quick, highly accurate check of fuel-air ratio, the Heat Prover has proved invaluable in controlling combustion conditions in open hearth furnaces, soaking pits, and annealing and normalizing furnaces. In a matter of seconds it tells our engineers how efficiently the furnaces are working—whereas former tests often took hours and didn't provide as accurate a picture. Anyone in this business can probably benefit from this ingenious device."

Supplied and maintained free by Cities Service, the remarkable Heat Prover is today used and applauded by scores of major steel producers. If you'd like to learn how it could simplify your operation as it has theirs, talk with your local Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

20TH CENTURY BLOWGUN—a bazooka—is readied by technicians for tapping open hearths. They are part of Granite City's 4800 skilled employees.

HEAT PROVER AT WORK at back of open hearth furnace. In minutes it provides accurate check on furnace efficiency—saves hours required by former testing.

CONTROL TOWER at blooming mill guides ingots as they pass through rollers. Granite City has capacity of 1,200,000 net tons of ingots annually.

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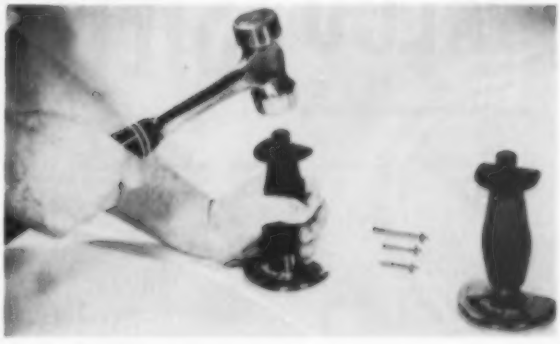
Shure-Set seats special fasteners into concrete, cinder blocks, brick and steel.

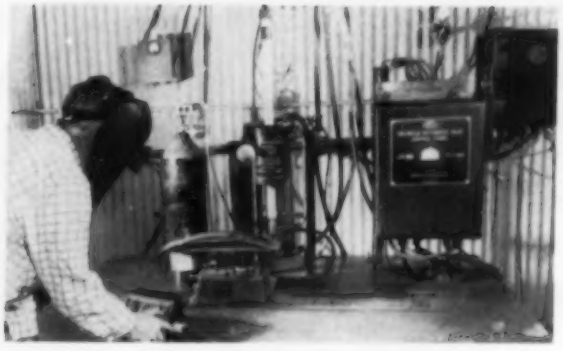
The base plate levels the tool at right angles to the work and protects the surface from misaimed hammer blows. A Neoprene grip keeps the hand from sliding.

Up to 150 drive pins or threaded studs (3/16 and $^1/_4$-in.) can be seated in 1 hour.

The detachable leveling plate makes it possible for fasteners to be placed in corners and other out-of-the-way places. *Write*: Ramset Fastening System, Olin Mathieson Chemical Corp., 12117 Berea Rd., Cleveland, O. *Phone*: Boulevard 2-1622



Automatic Welding Head Maintains Constant Arc Length



The Model C Heliweld head provides a completely automatic weld cycle. A single switch moves the holder downward to start the arc.

The electronically controlled unit does direct-current welding with argon or helium shielding gases, or a mixture of the two.

Electrodes from 0.040 to 5/32-in. and up to 24 in. long can be used. Arc length, once set, is held by automatic up-and-down movement of the holder in following irregular surfaces. The holder can be tilted 6 degrees from center. *Write*: Air Reduction Sales Co., division of Air Reduction Co. Inc., 60 E. 42nd St., New York 17, N. Y. *Phone*: Murray Hill 2-6700

Electronic Ear of Gear Speeder Inspects Automatically

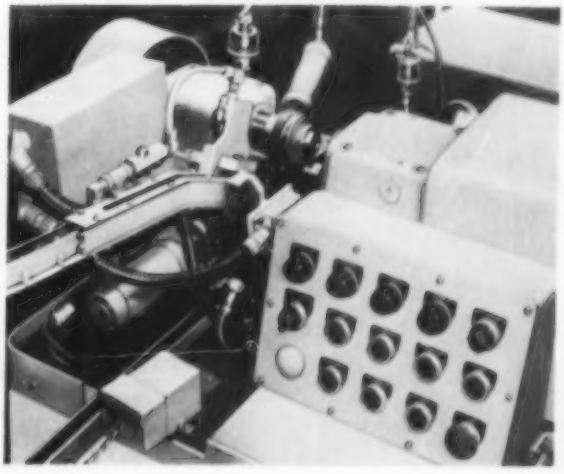
Small pinions are inspected by the Model GSR gear speeder. It takes the human element out of the appraisal of sound levels.

The gears are automatically loaded and run in mesh in both directions (with and without brake loading). An electronic sound discriminator, whose microphone is placed near the gear mesh area, passes or rejects the gear.

At any time, the discriminator unit may be adjusted to reject parts at the desired frequency and intensity range.

Separate electrical and pneumatic control panels are used because the machine must operate at minimum sound levels.

A 1-hp motor powers the speeder unit. Over 2000 pinions can be tested in an 8-hour shift. *Write*: National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich. *Phone*: Walnut 1-8980



3 Basic Reasons Why

ALCO STEEL RING FORGINGS

are Better

1 *Because ALCO makes its own steel . . .*

ALCO metallurgists and the customer determine the mix for the steel best suited for each type of ring forging application. This means grain size and deoxidation can be controlled; creep and impact properties can be determined; proper grain flow for stress distribution can be achieved. The result: you get the finest custom-made steel for your product.

2 *Because ALCO facilities are designed for precision manufacture . . .*

In every step of production, from ingot slicing to finishing, the very latest in precision equipment and production techniques are utilized. In the rolling operation, for example, hundreds of different rolls are employed for shaping outer and inner contours. ALCO machinists can produce either rough rings or rings machined to the most exacting tolerances and finish requirements.

3 *Because ALCO quality control guarantees specific properties . . .*

Throughout the entire manufacturing process, many types of mechanical and electronic testing devices are available for checking specific properties. These include tests for hardness, grain size, microstructure, nonmetallics, jominy, fatigue, impact, bend, corrosion, creep and inner soundness. You are assured of consistent quality in your finished products.

We invite you to talk with your nearby ALCO *representative to learn for yourself how* ALCO *ring forgings can be profitably incorporated in your product. Contact him today, or for more information send for our illustrated brochure. Sizes range from 18" OD to 145" OD.*

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☐ Please have representative call.

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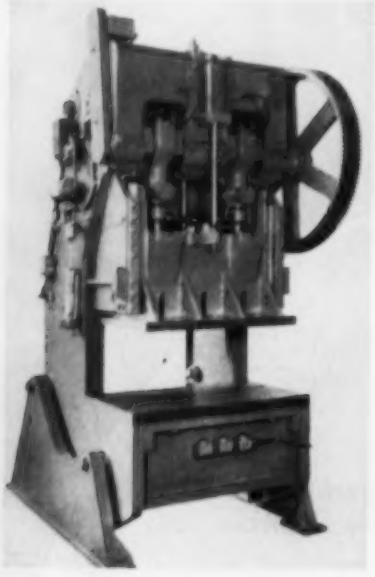
NEW PRODUCTS and equipment

Gap Press

The double-crank open-back unit is mounted on separate legs, so that the body of the press can incline for the gravity discharge of finished pieces.



Capacity is 250 tons. Stroke is 16 in. Slide adjustment is 10 in. The bed is 42 x 72 in. *Write*: Cleveland Punch & Shear Works Co., Cleveland 14, O. *Phone*: Henderson 1-1911

Rivet Setter

A blind rivet setting gun operates with a standard ¼-in. drill. The gun will set all lengths and all diameters of the company's aluminum, steel and Monel rivets.

Operation: Shaft is inserted in the chuck of the drill motor. Gun is held in one hand, drill in the other, and the pulling head is slipped onto the rivet stem. Drill motor is started, and the gun is pushed against the rivet head in line with the rivet stem.

The pushing action engages clutch faces and sets the rivets. When the pulling stem of the rivet breaks, the gun is removed from the work. *Write*: Townsend Co., P. O. Box 237-Z, New Brighton, Pa.

Paint Booth Coating

Oakite Shield, a sprayable paint booth coating, strips off in large pieces in seconds. Applied to dry booth surfaces, the material dries fast and clings tightly to vertical surfaces under paint overspray.

The product has the consistency of paint, is odorless, nontoxic and nonhazardous to store and use. *Write*: Oakite Products Inc., 134E Rector St., New York 6, N. Y. *Phone*: Whitehall 3-0940.

Speed Reducer

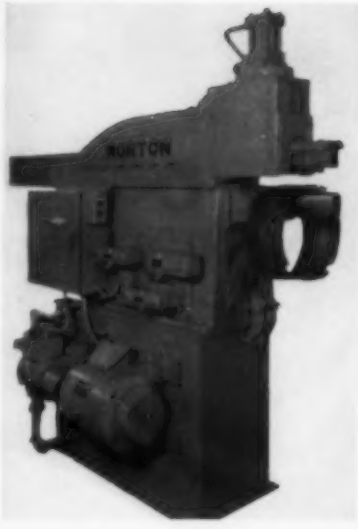
The redesigned, horizontal DOX double-reduction speed reducer with a zinc alloy housing is designed for light industrial applications. The reduction ratio range is from 4:1 to 1600:1; torque capacities range from 25 to 150 in.-lb at 1/6-hp.

Standard units have roller bearings. Sleeve bearings also are available. *Write*: Ohio Gear Co., 1333 E. 179th St., Cleveland 10, Ohio. *Phone*: Kenmore 1-0607

Flash Trimmer

Butt welded rings larger than 5 in. in diameter are trimmed on the inside and outside by this 8-in. stroke hydraulic machine.

Maximum wall thickness is ⅛-in. The work is ejected automatically when the trimming cycle is completed.



Three tool holders are provided in each ram. A 10-hp motor powers the machine. *Write*: Morton Mfg. Co., Broadway & Hoyt, Muskegon Heights, Mich. *Phone*: 3-2148

Band Saw

Model 1000 cuts rounds up to 10 in. and rectangular shapes 10 x 16 in. It is driven by a ¾-hp motor at speeds from 50 to 275 fpm.

A rugged counterbalanced frame and guide beam makes for accuracy and efficiency in production cutoff work. The vise swivels 45 degrees. Blades 1 in. wide are used. *Write*: Wells Mfg. Corp., 1515 Fillmore St., Three Rivers, Mich.

Coil Straightener

Model PDSC-940 is a combination coil cradle and power-driven straightener.

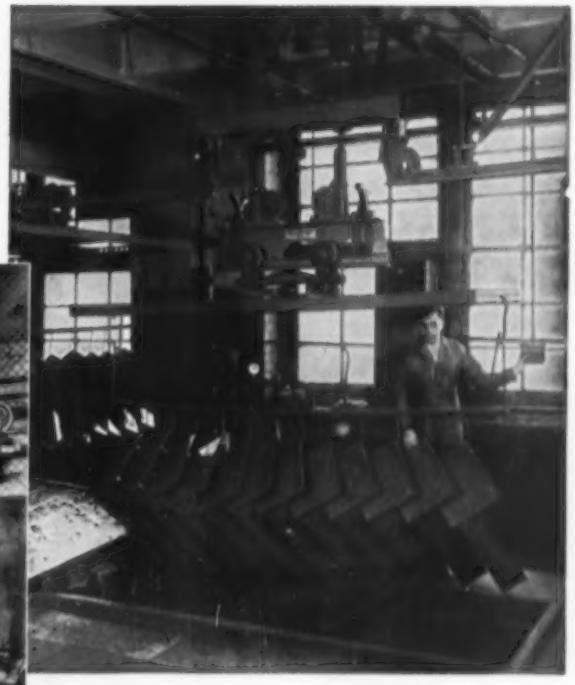
It handles coils weighing up to 1500 lb with up to 40 in. OD. The

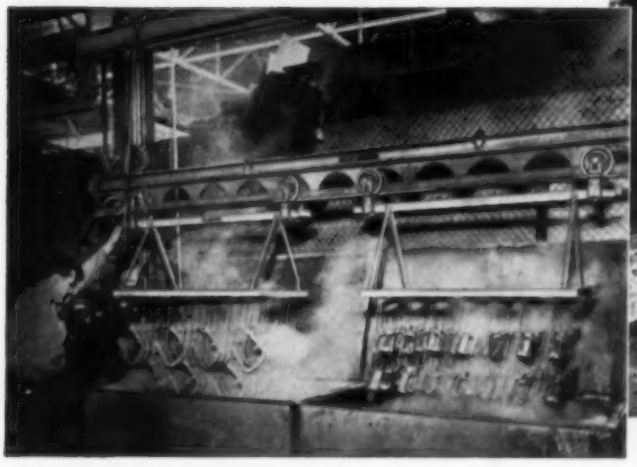
DROP SECTIONS...

for

DIPPING
CLEANING
PAINTING
PLATING

•





ACCELERATE PRODUCTION by eliminating hand-handling

Mass-production methods are made possible in the dipping, cleaning, painting and plating of parts by the use of Cleveland Tramrail Drop Sections.

Racks loaded with parts can be passed through a sequence of operations such as cleaning, drying, dip painting, dripping, baking, etc., without ever being touched by hand or removed from the Tramrail system.

The carriers with loaded racks are easily conveyed to the drop sections installed over the various tanks. The sections lower the parts into the solutions and elevate them to the original level, permitting the carriers to roll on to the next point.

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CONVEYORS

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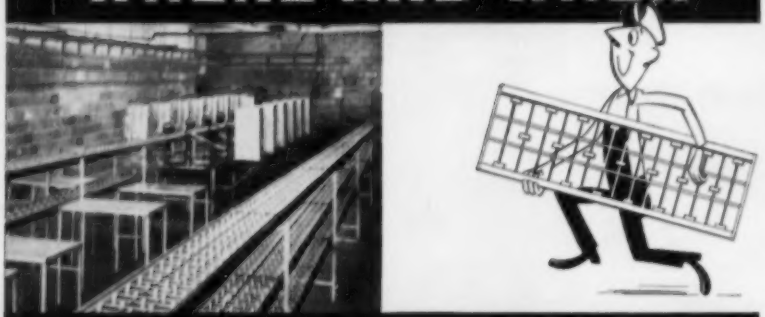

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NEW PRODUCTS and equipment

material can be up to 9 in. wide and from 0.025 to ⅛-in. thick.

The cradle has five coil rest rolls mounted in self-aligning bearings.

A pair of hardened and ground take-in rolls bring the material to a straightener equipped with six rolls mounted in needle bearings. The 2-hp variable speed drive gives outputs from 49 to 197 fpm. *Write*: U. S. Tool Co. Inc., Ampere (East Orange), N. J. *Phone*: Orange 5-4000

Single Crank Presses

A new line of single-crank, straight-side presses features fully streamlined, enclosed construction which conceals the driving mechanism. Improved accuracy and die life are assured by the all-steel,

one-piece frames of triple box section design. They provide maximum resistance to deflection from horizontal, diagonal and torsional stresses.

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On the strip mill . . . furnace doors . . . air, oil or fuel lines . . . engine exhausts . . . power lines Penflex Flexible Tubing has proved itself throughout the steel industry. Rugged . . . tough . . . flexible Penflex Tubing is made to stand the most severe usage.

From 1/8" to 24" I.D. . . . bronze, galvanized or stainless steel Penflex makes all types and sizes of flexible metal tubing. Penflex "Flexineering"—the science of applying flexible tubing to fit the particular needs of the steel industry—assures the right tubing on each installation.

When you require metal tubing that is tight as a pipe, but flexible . . . safe at high temperatures . . . and free from metal fatigue specify Penflex. Write for your copy of "Flexineering" today.

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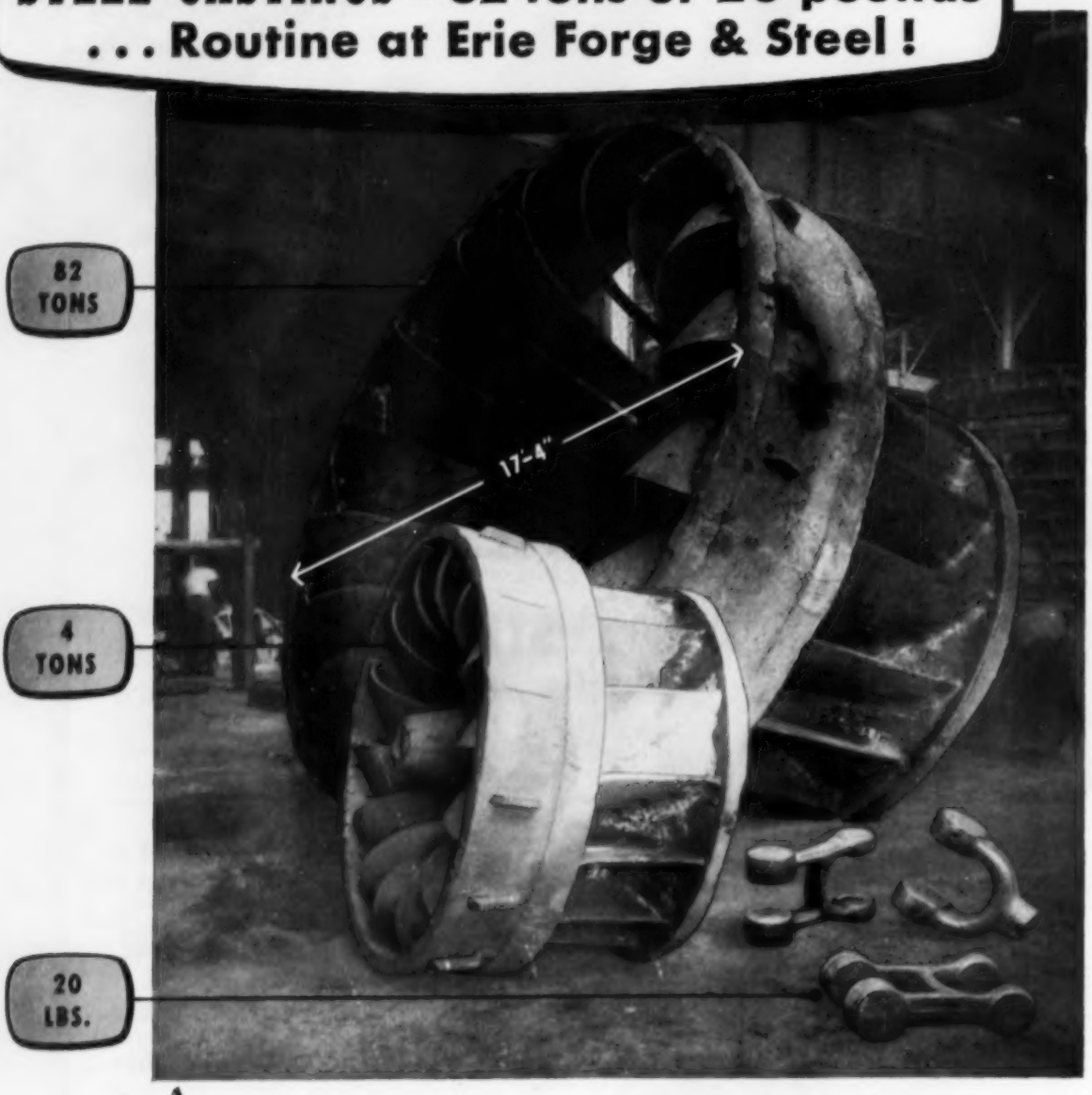
STEEL CASTINGS - 82 tons or 20 pounds ... Routine at Erie Forge & Steel!



A LONG JUMP from "the largest steel water wheel ever cast in one piece", 82 tons of it, to a 20 lb. engine casting . . . Routine at Erie Forge & Steel. Here is definite proof of our versatile production capabilities.

Engineers and metallurgists team up here with skilled craftsmen to control the production of steel castings and forgings from raw materials to finished product.

For example, engineering, metallurgy and production followed the 82 ton casting every step from raw materials to railroad spur to assure dimension and specification accuracy. "One responsibility and one control" is more than a slogan — here, it works for you.

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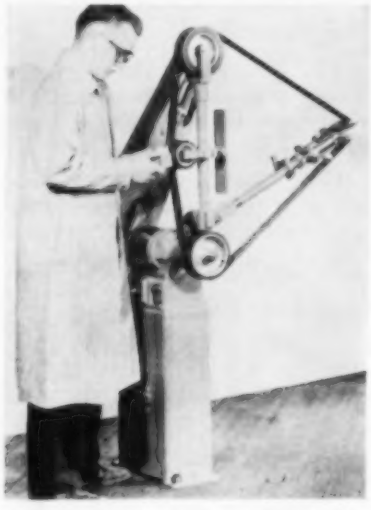
power adjusted through self-locking, barrel-type connections to accommodate a wide range of die heights and to permit quicker, easier and safer die setting. Great shut height and long slide adjustment permit the use of a wide range of stamping and forming dies.

The presses are available in capacities of 100 to 400 tons. *Write:* Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y. *Phone:* Taylor 4070

Abrasive Polishing

Model DBA-1F Flex-A-Belt is a multipurpose machine that does direct contact wheel and slack belt grinding, polishing and deburring.

It can be changed quickly from platen to formed belt grinding.



One shaft can be used for a buff, wire brush or grinding wheel. Both arms can be rotated 360 degrees. The unit has automatic belt tensioning and positive belt tracking. *Write:* Curtis Machine Corp., Jamestown, N. Y. *Phone:* 6-181

Hydraulic Tubing

Hydraluster tubing has an exceptionally smooth, satin-bright finish that virtually eliminates oxidation, scale and other adhering foreign matter that could restrict the flow of liquids and clog hydraulic systems. The tubing is annealed by a special process (with

Moves Big, Heavy Loads . . . *faster!*

Lifting heavy loads, like this unwieldy 78 foot steel beam, is an easy operation for a UNIT Model 1020 Crane. The LIFT and CONTROL ability of UNIT permits loading and unloading with speed and accuracy.

The Safety-promoting FULL VISION CAB enables the operator to see what he is doing at all times. If you have a material handling job that must be performed quickly, efficiently and with SAFETY . . . look into UNIT.

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A-8484-3/4-C

controlled atmosphere) that treats the inside of the tube as well as the outside.

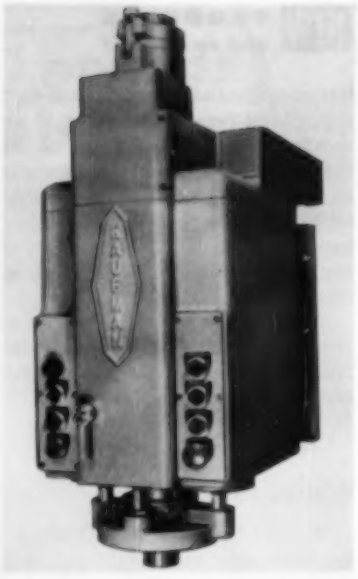
Cleanliness of the tubing is expected to reduce fabricating and cleaning costs, and the uniform surface permits easier bending and fitting without flattening or peeling the tube cross section. *Write*: Summerill Tubing Division, Columbia Steel & Shafting Co., Pittsburgh, Pa. *Phone*: Walnut 1-2126

Thread Tapper

The 101 Series tapper has spindle speeds from 35 to 785 rpm. It reverses at twice the forward speed.

A torque control signals overload and stops the machine automatically to avoid tap breakage. The working range for steel is up to 2 in. With fine pitch threads, diameters up to 5 in. can be cut.

The tapper can be mounted vertically, horizontally or in combination to do two or more operations. *Write*: Kaufman Mfg. Co., Manitowoc, Wis. *Phone*: 6641



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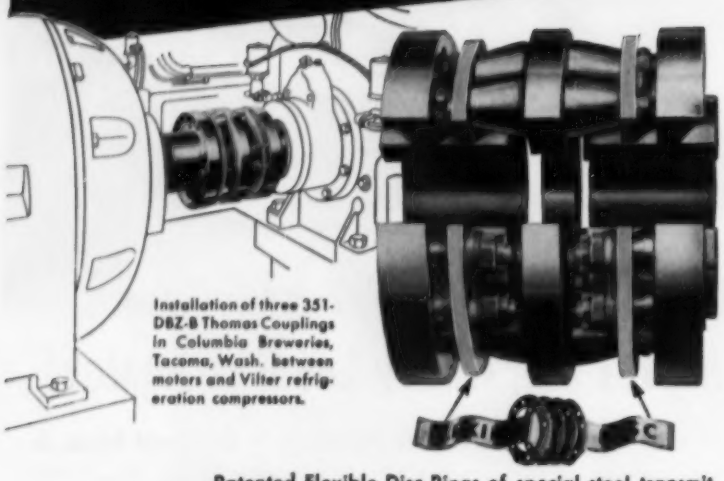
for more years of better service!

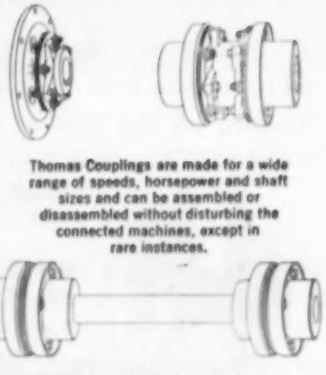


Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

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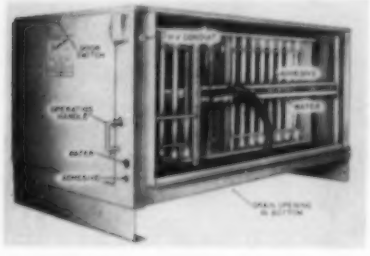
Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.

Air Cleaner

The Precipitron removes over 90 per cent of air-borne dirt. It needs only 38 in. of space in the direction of air flow.

Both washing and adhesive application cycles are completely controlled and operated from outside the unit.



Capacities range from 2000 to 10,640 cfm. *Write*: Department T-000, Sturtevant Division, Westinghouse Electric Corp., 200 Readville St., Hyde Park, Boston 36, Mass. *Phone*: Hyde Park 3-3700

Rust Inhibitors

Hydrin, a water-soluble chemical inhibitor, prevents rust on machined parts and stampings following washing and during temporary in-plant storage. Dissolved in the rinse water, the inhibitor coats parts with an invisible film that

eliminates the need for conventional petroleum-type coatings.

It permits easy inspection of parts and subsequent machining, painting or packaging without cleaning.

The interiors of empty steel drums and pails can be kept rust-free through the use of VCI (volatile corrosion inhibitors). After being stored outdoors for a year in Chicago, Jersey City, N. J., and New Orleans, new cold-rolled and hot-rolled drums remained rust-free. *Write*: Daubert Chemical Co., 333 N. Michigan, Chicago 1, Ill. *Phone*: Andover 3-4342

Basket Feeder

The sectional feeder and unloader transfers baskets to and from standard conveyor systems and process machinery.

The feeder and the unloader can be easily adapted to many custom engineered processing systems.

The feeder section and unloader section are available as independent units. *Write*: Circo Equipment Co., 51 Terminal Ave., Clark (Rahway), N. J. *Phone*: Fulton 8-8600

Goosenecks

Special alloy steel goosenecks for diecasting machines resist cracking, bottom breakout and spout erosion.

The goosenecks are custom made for any diecasting machine. They are furnished either rough, machined or machined with sleeves. *Write*: Finished Products Division, Dodge Steel Co., 6501 Tacony St., Philadelphia 35, Pa. *Phone*: Devonshire 2-2200

Refractories

Purocast-3000 is a high-purity castable refractory that resists spalling and shrinkage. Shipped dry in waterproof bags, it is placed by troweling, pouring, gunning or extruding and is recommended for use where conditions, such as reducing atmospheres, carbon deposition, irregular temperatures or abrasion, are present.

Helspot Brick, supplied in standard 9-in. series shapes, cupola blocks and tap-out blocks, is a graphite - base unburned brick, which is made by the dry-press method. It is recommended for use below the metal line in cupolas, ladles, runners, carriers and spouts.

A hydraulic setting ramming refractory, called Furn-A-Ram, is designed for lining aluminum melting furnaces. In the floors and sidewalls (below the metal line)

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SPECIFICALLY ENGINEERED . . . NEVER MERELY ADAPTED . . .
FOR EACH PARTICULAR TYPE OF APPLICATION

HANSEN
QUICK-CONNECTIVE
COUPLINGS

ONE-WAY SHUT-OFF
Shuts off one side of line

Gives quick connection and disconnection, with instant automatic flow or shut-off. To connect Coupling, and open line to flow of fluid, merely push Plug into Socket. To disconnect, a slight pull on sleeve releases Plug and shuts off supply end of line.

TWO-WAY SHUT-OFF
Shuts off both sides of line

To connect, pull back sleeve and push Plug into Socket. Identical torpedo type valves permit free flow of gas or liquid through Coupling. To disconnect, pull back sleeve . . . Coupling immediately disconnects, valves automatically seal both ends of line. Female pipe thread connections from ⅛" to 1". Available in brass or steel.

STRAIGHT-THROUGH COUPLING

Provides quick connection and disconnection, but does not have shut-off feature. Sizes, ranging from ¼" to 2½", carried in stock. Two special types of straight-through steam Couplings also available—one for low pressures, and one for high pressures.

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Quick-Connective Fluid Line Couplings for
Oil • Hydraulic Fluids
Grease • Steam • Water
Refrigerants • Acetylene
Air • Oxygen • Vacuum
Gasoline • Coolants
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SINCE 1915 QUICK-CONNECTIVE FLUID LINE COUPLINGS

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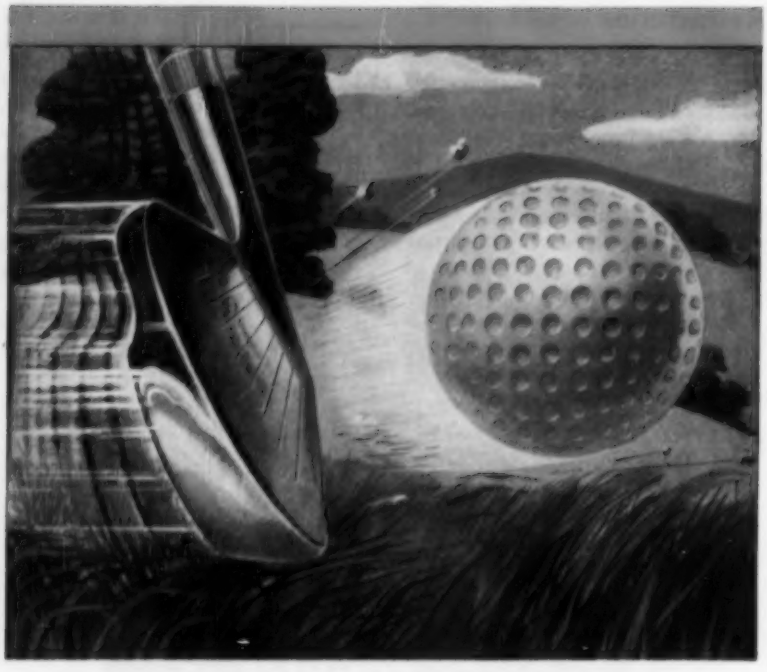


do you apply what every golfer knows?

forgings withstand repeated shock safely

With a *crack* the iron sends the ball winging toward the pin at an initial speed up to 250 ft. per second (170 MPH!), and often kicks some pebbles along with the ball, too. That's shock, rough treatment for metal. But a *forged* golf club head lasts a lifetime. The dense metal is free from internal weakness because it is closed-die forged.

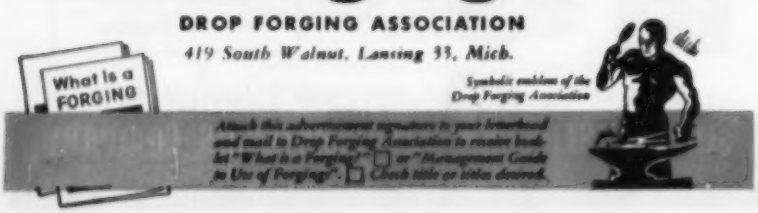
This lesson from the golf club applies to parts for every kind of machine, tool, and equipment. You can trust forged metal. It increases safety. Because the metal is internally sound as you machine into it, it cuts costs for machining, inspection, and rejections. It is uniform to withstand shock and fatigue. Take full advantage of forgings to improve your product, to cut your costs. Send for the booklets described below, and call in a Forging Engineer, to learn what forgings offer you.

closed-die **forgings** for metal you can trust

DROP FORGING ASSOCIATION

419 South Walnut, Lansing 33, Mich.

Symbolic emblem of the Drop Forging Association

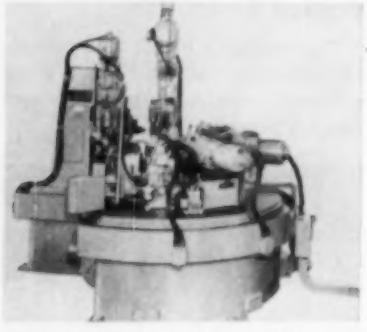

What is a FORGING
Attach this advertisement signature to your letterhead and mail to Drop Forging Association to receive booklet "What is a Forging?" ☐ or "Management Guide to Use of Forgings". ☐ Check title or titles desired.

NEW PRODUCTS and equipment

of such furnaces, it resists the penetration of the metal. When repairs are to be made, they may be completed easily, without the usual difficulties of floor removal. *Write*: Mexico Refractories Co., Mexico, Mo. *Phone*: 1250

Special Machine

This 12-station, horizontal indexing, drilling and milling machine drills, taps, slots, straddle mills and broaches nine different brass throttle shafts.



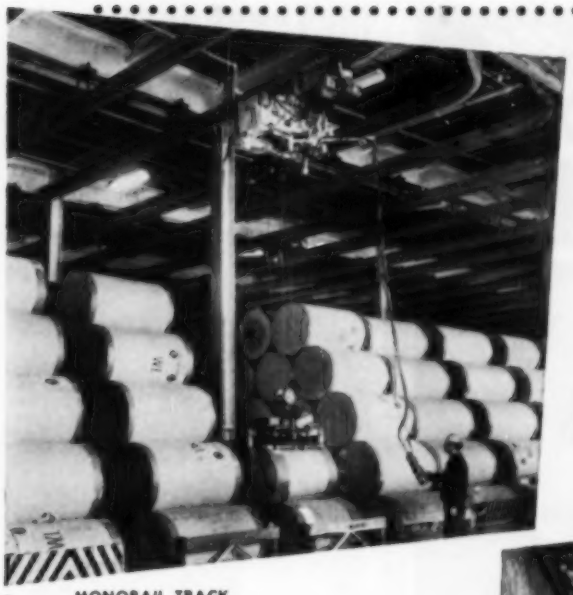
Five cam-feed drill units, one lead-screw tapping unit and one air-operated broach are used to process the parts. Four drill units with milling attachments are mounted horizontally. One is mounted vertically. The lead-screw tapping unit is mounted vertically.

Parts are loaded in a V-block (which has a hand screw clamp) and automatically indexed through the cycle. Top production is 600 parts an hour. *Write*: Machine Tool Division, Hartford Special Machinery Co., 294 Homestead Ave., Hartford 12, Conn. *Phone*: Jackson 5-1401

Bar Unloader

This machine unloads pieces of bar or tubing from a production cutoff machine to a high tote box. It has one stationary tower and one movable elevator, so that it can be adjusted to handle pieces from 3 to 12 ft long and from 1½ to 3 in. in diameter.

Operation: Bar or tubing flows from the production unit into a V-shaped trough which is tripped to one side as the piece leaves the



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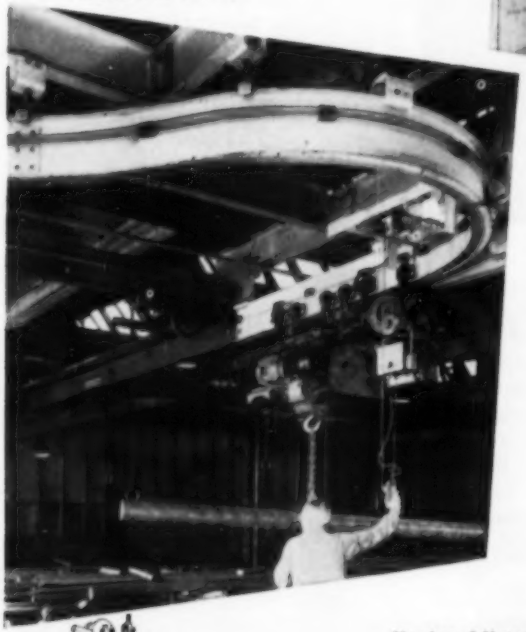

By following the guide prepared by members of the MonoRail Manufacturers Association when purchasing materials handling equipment, you are assured of getting maximum safety and minimum maintenance and still satisfy your operating requirements.

The guide represents the efforts of the combined experience of all the engineers of the association members. The specification guide has just been published.

A copy of these specifications will be forwarded on request. Write also for a copy of the American MonoRail Bulletin C-1 describing hundreds of successful solutions to handling problems.

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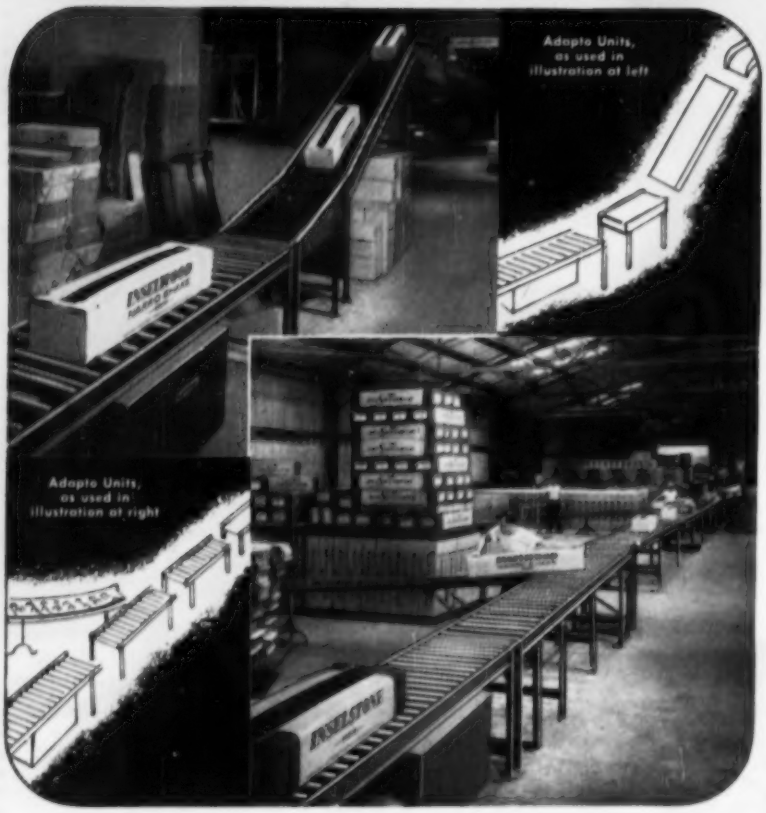

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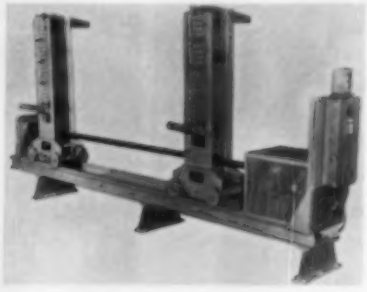
machine. The piece falls down an incline until it is picked up by the cleats on the two elevating conveyors which operate in unison. It is lifted to the top of the con-



veyors and over to the other side of the unloading machine where it rolls into the tote box. *Write*: Feedall Inc., Willoughby, O. *Phone*: Willoughby 2-8100

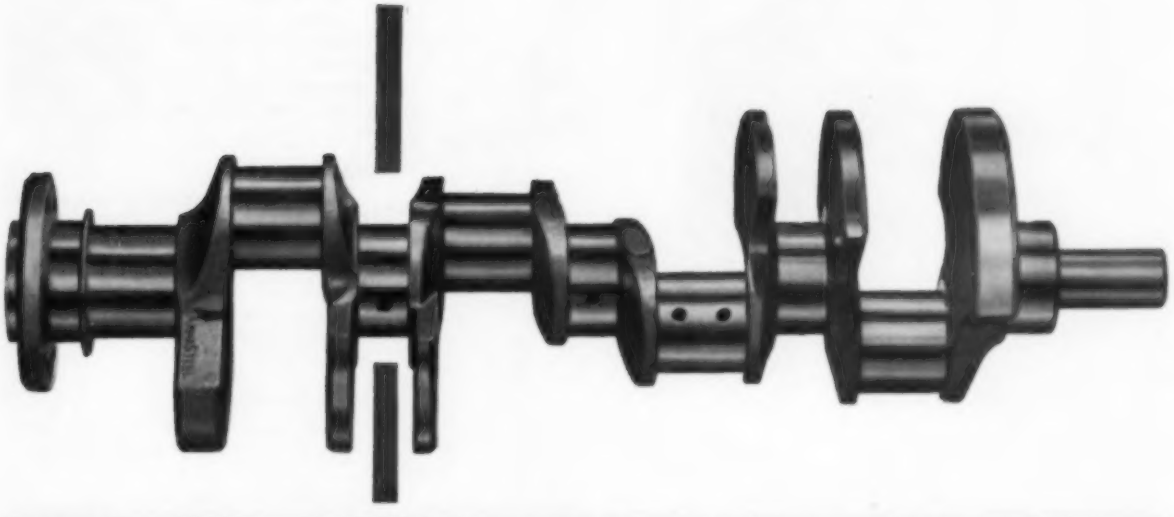
Press Line

These units take minimum floor space because they have an unusual left-to-right gear drive.

The flywheel, clutch and motor drive are mounted between twin intermediate shafts. This compact drive system is housed within a symmetrical box crown.

All air and electrical lines are built into the massive uprights. Capacities range from 150 to 750 tons. *Write*: E. W. Bliss Co., 1375 Raff Rd. S. W., Canton 10, O. *Phone*: 7-3421

the step-by-step story of how ARMASTEEL shell-cast crankshafts saved machine time, tools, and labor for Pontiac Motor Division



After years of research and experimentation, the Pontiac Motor Division in 1955 began installing cast crankshafts in their automobiles, and in 1956 completed a 100% conversion to castings. The radical change-over is directly due to Central Foundry Division's tough casting metal, ARMASTEEL, plus their close-tolerance SHELL MOLD process. With less excess metal to remove, and the high machinability of ArmaSteel, Pontiac found the new cast crankshafts resulted in savings all the way down the finishing line. Take it step by step . . .

1 **THE FIRST STEP IN MACHINING** crankshafts is milling the driving pads. Here, production has risen from 80 forged steel parts per hour to 96 ArmaSteel. Tool life on ArmaSteel is more than double that for steel forgings.

2 **SECOND STEP IN THE PROCESS** is turning in-line diameters. Lathe speed has been almost tripled (from 53 to 153 R.P.M.) since the change, and rack-to-rack cycle time halved (1.5 minutes vs. 3.0).

3 **THIRD STEP** . . . rough grinding main journals. Grinding wheel life is greatly increased, and production upped from 32.5 to 45 per hour.

4 **FOURTH STEP** is rough turning of crankpins. Increase here is from 24 steel to 46 ArmaSteel parts per hour.

5 **FIFTH STEP** is finish turning on crankpins. Production has been doubled . . . 46 ArmaSteel parts against 21 steel per hour.

6 **IN THE REMAINING OPERATIONS**, which include finish grinding on main journals, straightening, tapping, and drilling, a similar increase in production and extended tool life have been experienced.

THROUGHOUT, MACHINE TIME, TOOLS, LABOR, and long-range capitalization have been decreased by the change to shell-cast ArmaSteel. Similar savings have been realized by many other manufacturers who have changed to shell-cast ArmaSteel parts. For information on how your product can also benefit, write today for your copy of the "ARMASTEEL" catalog and pamphlet "Shell Molding at Central Foundry".

69

CENTRAL FOUNDRY DIVISION

GENERAL MOTORS CORPORATION • SAGINAW, MICHIGAN • DEPT. 20

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- MALLEABRASIVE is produced only by manufacture under the full and complete MALLEABRASIVE process—used by Globe exclusively.

The qualities that make Malleabrasive distinctively different have made it the most widely used premium abrasive in the world today. In hundreds of plants it has made important reductions in blast-cleaning costs. Undoubtedly it can do the same in yours. At least, why not investigate its possibilities? Write us.

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NEW literature

Write directly to the company for a copy

Gaging Systems

Catalog 56 AM, 26 pages, covers electric, air-electric, electronic and air-electronic control systems used in automatic gaging. Federal Products Corp., 1144 Eddy St., Providence 1, R. I.

Adhesives

U. S. government specifications for adhesives, coatings and sealers are listed (along with the product that meets the requirements) in a 14-page folder. Adhesives & Coatings Division, Minnesota Mining & Mfg. Co., 423 Piquette Ave., Detroit 2, Mich.

Sling Loads

Safe loads for 20 sizes of wire rope slings are listed in bulletin 5308-R, 4 pages. Sling Department, Macwhyte Co., Kenosha, Wis.

Industrial Gases

Plants for making oxygen, nitrogen, acetylene and other industrial gases are described in a 20-page catalog. Superior Air Products Co., 132 Malvern St., Newark 5, N. J.

Casting Aluminum

A 130-page handbook gives information on the design and production of aluminum castings. Desk PR4810, Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.

Tooling Inserts

More than 200 tools in 17 holder styles are listed in bulletin B-301, 12 pages. Kennametal Inc., Latrobe, Pa.

Screw Machines

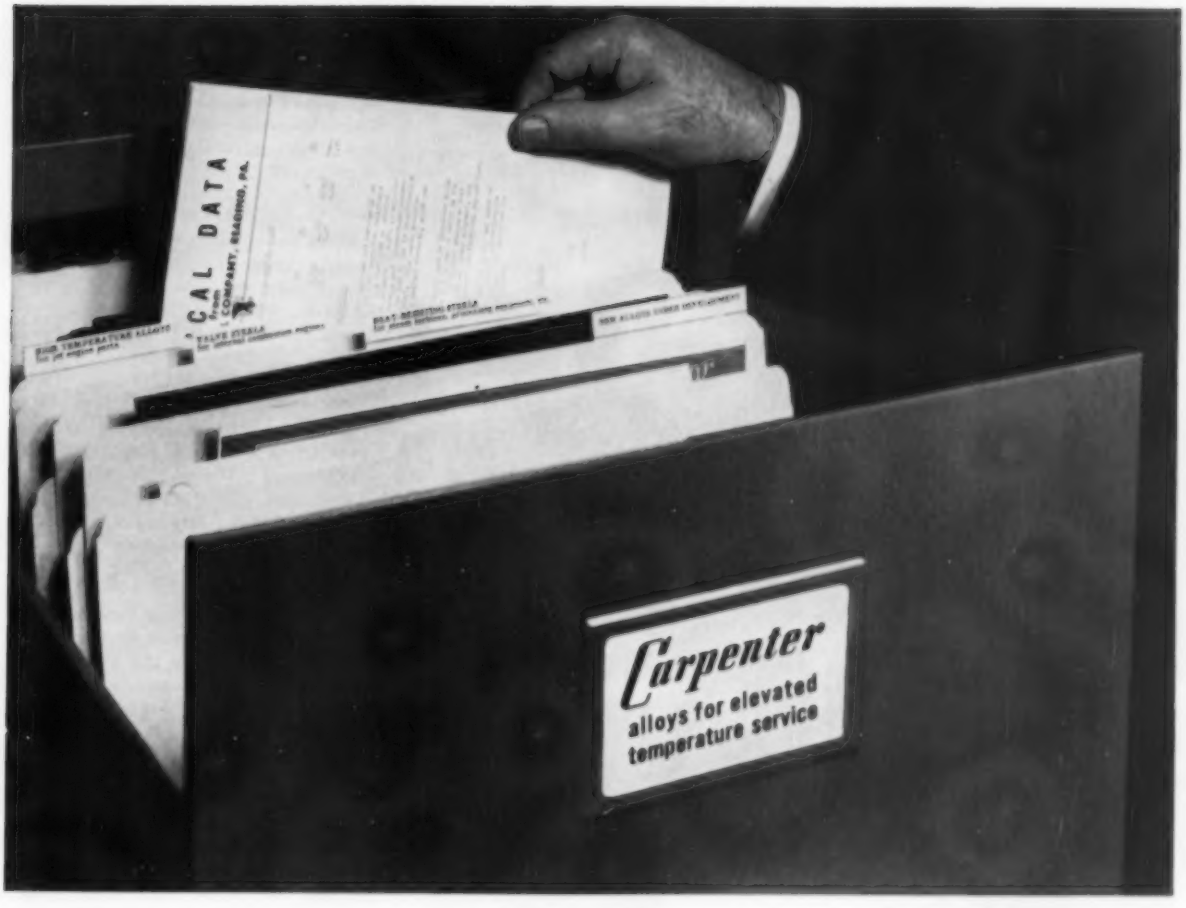
Specifications for a complete line of single-spindle automatics are listed in an 8-page booklet. Cleveland Automatic Machine Co., Cincinnati 12, Ohio.

Cranes

A 40-page handbook includes information on the latest developments in electrical overhead crane manufacture, classification of cranes, runways, electrical equipment and other data of interest to crane users, and prospective purchasers—catalog M-100. Dominion Bridge Co. Ltd., Box 280, Montreal, Quebec, Canada.

Electrical Tape

"Big Four Electrical Tapes" will help you choose the right tape for every insulating and protecting use



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NEW LITERATURE

in electrical construction, maintenance and manufacturing—12-pages. Johns-Manville, Dutch Brand Division, 7800 S. Woodlawn Ave., Chicago 19, Ill.

Double Action Presses

A 28-page catalog lists features, specifications and dimensions of a line of straight side presses of 200 to 2000-ton capacity. Danly Machine Specialties Inc., 2100 S. Laramie Ave., Chicago 50, Ill.

Steel Shelving

Klip-Bilt boltless shelving is the subject of 12-page catalog 706. Quickly and easily erected, it is available in open, closed and ledge models. Frick-Gallagher Mfg. Co., 110 S. Michigan Ave., Wellston, O.

Roller Bearings

Greater load capacity and simplified application are two of the many desirable features of this company's self-aligning roller bearings described in Book No. 2658—8 pages. Link-Belt Co., Department PR, Prudential Plaza, Chicago, Ill.

Wire Rope Assemblies

Bulletin TL 500, 24 pages, details construction features, uses, breaking strengths and other data on Tru-Loc fittings and wire rope assemblies. American Chain & Cable Co. Inc., 929 Connecticut Ave., Bridgeport 2, Conn.

Ribbon Burners

Gas-fired heating units which produce a narrow, uniform sheet of flame are described in bulletin SC-1004, 8 pages. Selas Corp. of America, Dresher, Pa.

Motors and Generators

Direct-current motors from 1 to 150 hp, built to new NEMA standards, are presented in bulletin GEA-6355, 12 pages. Bulletin GEA-6461, 6 pages, describes generators. General Electric Co., Schenectady 5, N. Y.

Precision Bearings

Catalog AFB-1, 32 pages, gives dimensions and load ratings for single row, double row, deep groove radial and angular contact bearings for special applications. Industrial Tectonics Inc., 3684 Jackson Rd., Ann Arbor, Mich.

Tractor-Shovel

A Payloader with a heaped capacity of 2¼ cu yd is described in a 4-page bulletin. Frank G. Hough Co., Libertyville, Ill.

"You say I can see vibration, measure it, and eliminate it?"

1 "How much vibration do you think my machine has?"

No need to guess—the Veelos Vibration Analyzer shows exactly! This amazing electronic tester measures vibration amplitude down to *2-millionths of an inch*—tests one belt against another, actually shows which belt has "invisible shakes" . . . and how much! Don't guess about vibration; it's costing you hard cash every minute you ignore it. Ask your Veelos salesman to test your belts with the Vibration Analyzer.

2 "Isn't vibration caused by a number of things?"

Vibration can be caused by bearings, motor, clutch, sheaves or V-belts. Quite often it is caused by V-belts alone. The Veelos Vibration Analyzer uses a "strobe" light which "stops" the motion—shows exactly *what* is vibrating! It shows you precisely how much vibration you're paying for, and lets you correct it. The Vibration Analyzer gives positive proof, and the test takes only 15 minutes. It's free, of course.

3 "How do I eliminate costly belt vibration?"

Install Veelos, in place of ordinary V-belts! V-belts have spots of varying density, due to their construction, which throw them out of balance. Veelos belts are absolutely uniform; every stud and link is identical; *every foot of the reel* is identical and uniform; and they're perfectly balanced! Test any belt for vibration against Veelos—you're in for a shock. Your Veelos salesman will show you how to cut costs and improve your operation.

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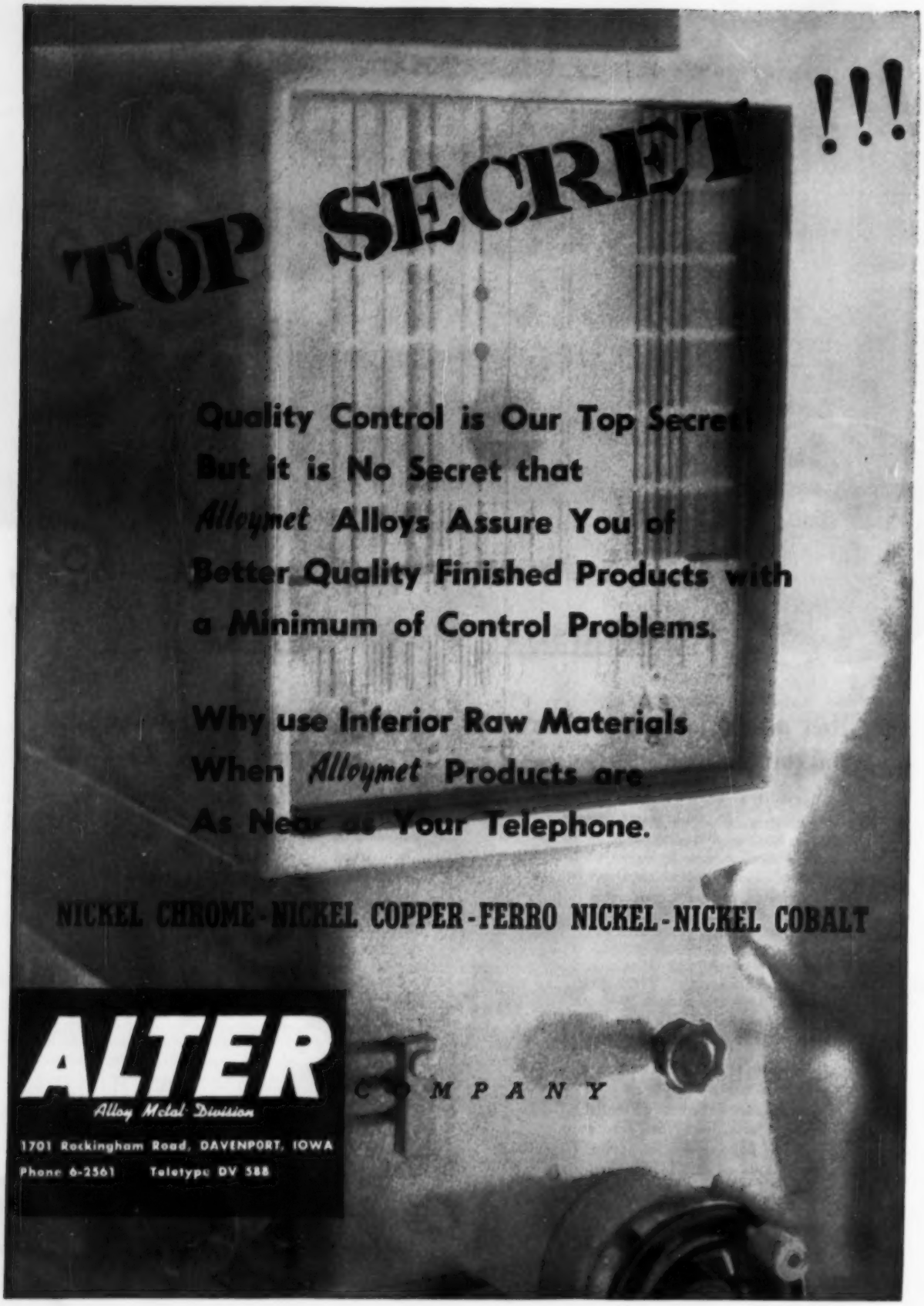
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Market Outlook

LOOKING for clues about business for the last half of this year?

Look at this: Steel production in the U. S. for all of this year will set a new record. This means output of steel for ingots and castings must exceed 117 million net tons, the record set last year.

PROJECTION— Production in the first half of 1956 will be around 64 million tons—99.8 per cent of capacity. To beat last year's total, the second half of 1956 would have to exceed 53 million tons. This would be only 83 per cent of capacity, and analysts don't think the rate will be that low. They're talking about a minimum of 122 million tons for the year—which means the last half would have to yield around 58 million tons. This would require an operating rate averaging 90 per cent.

RECORD-BOUND— A 90-per-cent rate in the last half is conceivable, analysts say. Most people expect the third quarter to be slower than the fourth. We could have a 90-per-cent rate for the half by having 85 per cent in the third quarter and 95 per cent in the fourth. Analysts think these quarterly rates are, if anything, on the low side. Any way you look at it, this year will produce a new record for steelmaking.

SUPPORT— Among the optimistic are Eugene G. Grace, chairman of Bethlehem Steel Co., the country's second largest steel producer. He believes his company will operate close to 100 per cent of ingot capacity for the rest of 1956.

Avery C. Adams, president, Pittsburgh Steel Co., says order backlogs and commitments indicate his company can maintain capacity operations for all of this year.

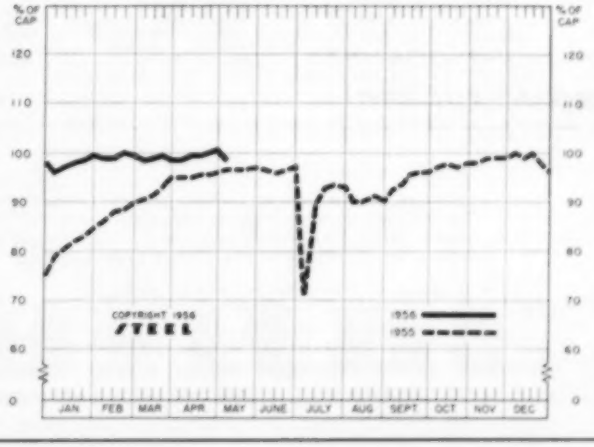
Henry Roemer, chairman, Sharon Steel Corp., reports his company's order backlog indicates capacity operations through at least the third quarter of this year—and this is the quarter most people expect to be the year's poorest.

CURRENT OUTPUT— Producers of steel are having difficulty keeping up with demand. Output in the week ended May 6 declined 2 points because of a railroad strike at U. S. Steel Corp.'s Tennessee Coal & Iron Division, Birmingham. This lowered the national rate to 98.5 per cent of capacity. Other handicaps to producers are the necessity to take equipment out for repair.

CHANGE IN MIX— Jones & Laughlin Steel Corp. says the decline in automobile production and the time out for auto model changes may make some changes in product mix. At J&L, the change might bring an increase in output of tubular products and galvanized sheets. (Some of the tubular products, particularly seamless, are in strong demand.) With U. S. Steel Corp., any change in product mix might include increased production of plates and structural shapes, both in heavy demand. A shift from the light, flat-rolled products would leave more steel for other products.

PRICES RISE— Steel prices continue to inch upward. Some of the tubular products went up an average of 2 per cent last week. Tin mill products rose last week, and one producer boosted plates $11 a ton. These pushed STEEL's arithmetical price composite on finished steel to $128.98 a net ton, a 96-cent rise.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended May 6	Change	Same Week 1955	Same Week 1954
Pittsburgh	102	— 4*	99.5	67.5
Chicago	100.5	+ 0.5	99	79.5
Mid-Atlantic	100	+ 1	96.5	56
Youngstown	97	0	98	68
Wheeling	103	+ 6.5	95.5	83.5
Cleveland	93.5	— 2	100.5	76
Buffalo	105	0	104.5	67.5
Birmingham	23.5	—72	93.5	56.5
New England	88	+ 1	88	55
Cincinnati	93	— 6	93.5	61.5
St. Louis	94	— 2.5	106.5	72.5
Detroit	99.5	+ 2	92	63
Western	109	+ 2	96	72
National Rate	98.5	— 2	96.5	67

INGOT PRODUCTION‡

	Week Ended May 6	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	152.5†	153.9	149.8	145.1
NET TONS (In thousands)	2,450†	2,473	2,406	2,331

*Change from preceding week's revised rate.

†Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,384,549 in 1954.

Metalworking Outlook—p. 47 Technical Outlook—p. 93

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	May 1 1956	Apr. 24 1956	Month Ago	Apr. Average
(1947-1949=100)	157.9	157.1	157.1	157.1

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended May 1

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard, No. 1	$4.800	Sheets, Electrical	$10.175
Rails, Light, 40 lb	6.217	Strip, C.R., Carbon	8.243
Tie Plates	5.625	Strip, C.R., Stainless, 403 (lb)	0.444
Axles, Railway	8.350	Strip, H.R., Carbon	5.606
Wheels, Freight Car, 33 in. (per wheel)	52.50	Pipe, Black, Buttweld (100 ft)	16.997
Plates, Carbon	5.200	Pipe, Galv., Buttweld (100 ft)	21.137
Structural Shapes	4.867	Pipe, Line (100 ft)	169.109
Bars, Tool Steel, Carbon (lb)	0.460	Casing, Oil Well, Carbon (100 ft)	165.120
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.560	Casing, Oil Well, Alloy (100 ft)	248.457
Bars, Tool Steel, H. R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185	Tubes, Boiler (100 ft)	40.243
Bars, Tool Steel, H.R., Alloy, High Speed W-18, Cr 4, V 1 (lb)	1.680	Tubing, Mechanical, Carbon	21.247
Bars, H.R., Alloy	9.425	Tubing, Mechanical Stainless, 304 (100 ft)	178.897
Bars, H.R., Stainless, 303 (lb)	0.450	Tin plate, Hot-dipped, 1.25 lb	9.333
Bars, H.R., Carbon	5.500	Tin Plate, Electrolytic, 0.25 lb	8.033
Bars, Reinforcing	5.313	Black Plate, Canmaking Quality	7.133
Bars, C.F., Carbon	8.800	Wire, Drawn, Carbon	8.575
Bars, C.F., Alloy	12.275	Wire, Drawn, Stainless 430 (lb)	0.590
Bars, C.F., Stainless, 302 (lb)	0.475	Bale ties (bundle)	6.537
Sheets, H.R., Carbon	5.345	Nails, Wire, 8d Common	8.596
Sheets, C.R., Carbon	6.214	Wire, Barbed (80-rod spool)	7.847
Sheets, Galvanized	7.770	Woven Wire Fence (20-rod roll)	18.636
Sheets, C.R., Stainless 302 (lb)	0.588		

STEEL's FINISHED STEEL PRICE INDEX*

	May 2 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	210.45	209.10	209.10	194.53	171.92
Index in cents per lb	5.701	5.665	5.665	5.270	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$128.98	$128.02	$128.02	$118.45	$106.32
No. 2 Fdry Pig Iron, GT	60.27	60.27	60.27	56.54	52.54
Basic Pig Iron, GT	59.80	59.80	59.80	56.04	52.16
Malleable Pig Iron, GT	61.27	61.27	61.27	57.27	53.27
Steelmaking Scrap, GT	55.00	55.33	54.17	35.33	44.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	May 2 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.30	3.70
Bars, H.R., Chicago	4.65	4.65	4.65	4.30	3.70
Bars, H.R., deld. Philadelphia	4.93	4.93	4.93	4.55	4.20
Bars, C.F., Pittsburgh	6.25*	6.25*	6.25*	5.40	4.55
Shapes, Std., Pittsburgh	4.60	4.60	4.60	4.25	3.65
Shapes, Std., Chicago	4.60	4.60	4.60	4.25	3.65
Shapes, deld., Philadelphia	5.00	5.00	5.00	4.53	3.91
Plates, Pittsburgh	4.50	4.50	4.50	4.225	3.70
Plates, Chicago	4.50	4.50	4.50	4.225	3.70
Plates, Coatesville, Pa.	4.80	4.80	4.80	4.225	4.15
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.225	3.70
Plates, Claymont, Del.	5.35	4.80	4.80	4.225	4.15
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.60-3.75
Sheets, H.R., Chicago	4.325	4.325	4.325	4.05	3.60
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Chicago	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Detroit	5.325-5.425	5.325-5.425	5.325-5.425	5.10	4.55
Sheets, Galv., Pittsburgh	5.55	5.55	5.55	5.45	4.80
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.75-4.00
Strip, H.R., Chicago	4.325	4.325	4.325	4.05	3.50
Strip, C.R., Pittsburgh	6.25	6.25	6.25	5.75	4.65-5.35
Strip, C.R., Chicago	6.25-6.35	6.25-6.35	6.25-6.35	5.85	4.90
Strip, C.R., Detroit	6.35	6.35	6.35	5.90	4.35-5.60
Wire, Basic, Pittsburgh	6.60	6.60	6.60	5.75	4.85-5.10
Nails, Wire, Pittsburgh	7.60	7.60	7.60	6.85	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.85	$9.45	$9.45	$9.05	$8.70

*Including 0.35c for special quality

SEMIFINISHED STEEL					
Billets, Forging, Pitts. (NT)	$84.50	$84.50	$84.50	$78.00	$66.00
Wire rods, $\frac{1}{4}$-$\frac{5}{8}$" Pitts.	5.375	5.375	5.375	4.675	4.10-4.30

PIG IRON, Gross Ton					
Bessemer, Pitts.	$61.00	$61.00	$61.00	$57.00	$53.00
Basic Valley	60.00	60.00	60.00	56.00	52.00
Basic, deld. Phila.	63.76	63.76	63.76	59.66	56.49
No. 2 Fdry, Pitts.	60.50	60.50	60.50	56.50	52.50
No. 2 Fdry, Chicago	60.50	60.50	60.50	56.50	52.50
No. 2 Fdry, deld. Phila.	64.26	64.26	64.26	55.16	56.99
No. 2 Fdry, Birm.	55.00	55.00	55.00	52.88	48.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58	55.33
Malleable, Valley	60.50	60.50	60.50	56.50	52.50
Malleable, Chicago	60.50	60.50	60.50	56.50	52.50
Ferromanganese, Duquesne	215.00†	215.00†	215.00†	190.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$53.50	$55.50	$54.50	$35.50	$45.00
No. 1 Heavy Melt, E. Pa.	57.00	56.00	53.50	36.50	43.50
No. 1 Heavy Melt, Chicago	54.50	54.50	54.50	34.00	43.50
No. 1 Heavy Melt, Valley	57.50	59.50	58.50	34.50	45.00
No. 1 Heavy Melt, Cleve.	54.50	56.50	56.00	31.50	44.00
No. 1 Heavy Melt, Buffalo	55.50	55.00	52.50	30.50	44.00
Rails, Rerolling, Chicago	72.50	72.50	72.50	52.50	52.50
No. 1 Cast, Chicago	52.50	52.50	51.50	40.50	49.00

COKE, Net Ton					
Beehive, Furn, Connisvl.	$14.125	$14.125	$14.125	$13.75	$14.75
Beehive, Fdry, Connisvl.	16.50	16.50	16.50	16.75	17.50
Oven, Fdry, Chicago	27.00	27.00	27.00	24.50	21.00

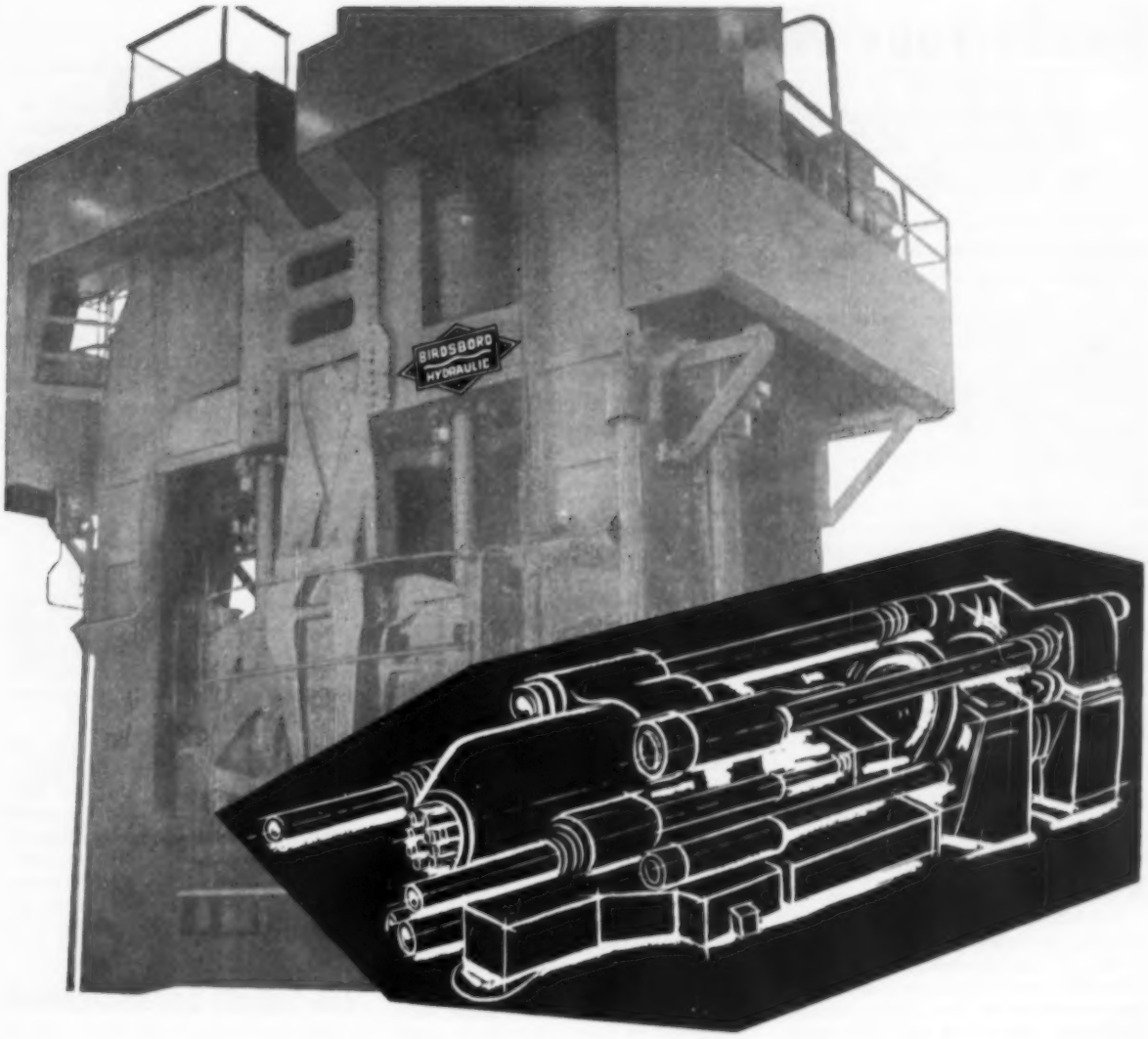
Daily Nonferrous Price Record

	May 2 Price	Last Change	Previous Price	Apr. Avg.	Mar. Avg.	May 1955 Avg.
Copper	45.00-46.00	May 2, 1956	45.50-46.00	47.500	49.727	36.000
Lead	15.80	Jan. 13, 1956	16.30	15.800	15.800	14.800
Zinc	13.50	Jan. 6, 1956	13.00	13.500	13.500	12.000
Tin	98.125	May 2, 1956	97.75	99.270	100.606	91.410
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	64.500
Aluminum	25.90	Mar. 29, 1956	24.40-25.90	24.650	24.650	23.200
Magnesium	33.75	Apr. 16, 1956	32.500	33.150	32.500	28.500

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, pig, 99.8%, Velasco, Tex.

What You Can Use the Markets Section for:

- **A source of price information.** Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.** Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.** Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.** Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**



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New York Office: **Engineering Supervision Co.,** *743 Fifth Ave., New York 22, N.Y.*

Nonferrous Metals

Copper prices continue to fall. Users are hesitant, but most are accepting May quotas. Reason: Labor negotiations are in the offing

Nonferrous Metal Prices, Pages 148 & 149

COPPER PRICES are acting like a prizefighter whose knees buckle after a solid right to the jaw. A few weeks ago London metal men were wondering how the U. S. could keep from raising the price of primary copper from the 46-cent-a-pound level. Now they are asking the reverse.

Explanation — Last Monday the Rhodesian Selection Trust Ltd. reduced its price on the red metal to 43.75 cents a pound. Previous quotation: 48.13 cents. The London Metal Exchange reacted quickly to this news. Prices dropped to 42.88 cents (first call, Apr. 30).

There are indications that fabricators are working off inventories and waiting to see where prices may stabilize. European demand, seriously hampered by tightening credit restrictions, continues to dwindle.

Floor — Anaconda Co. has taken Chile off the ropes by announcing that it will base the price of its Chilean copper on the LME quotation only when it is higher than the U. S. primary price of 46 cents.

But before you contemplate 30-cent copper, remember that labor negotiations are only several weeks away. CIO-AFL recruiting forces are eyeing the members of the Mine, Mill & Smelters' Union. It is anticipated that the sought after group will have to make a good showing or lose prestige. Above all, it must avoid criticism. On the other side of the table, management realizes that it will have to present a substantial package if it hopes to avert a crippling strike. If it does, union leaders may be hard pressed to find a basic issue to argue about.

Outlook: 1. London will watch the U. S. copper market closely, hoping that primary producers can maintain the 46-cent level. 2. Custom smelters may drop quotations below the 45-cent mark in the next two weeks. 3. Chilean copper could fill the gap for any strikes of short duration (less than a week). 4. A two-week strike involving any of the large producers could send the LME price up.

Lead, Zinc Sales Light

Lead and zinc sales are light to moderate. Stable prices may be causing part of the slowdown. Consumers feel that they need to buy only enough to cover immediate needs. The battery industry is slowly coming to life, but producers of special high grade zinc still wonder when Detroit will commence to order larger tonnages. Key: The Motor City is still looking for the spring rush. Meanwhile, the General Services Administration continues to enter the market for both metals. Technically, GSA is only authorized to buy lead and zinc through the current fiscal year (ends June 30, 1956), but there is little doubt that funds will be made available to meet expanded stockpile goals for these metals.

Department of Things-to-Come: Look for more and more talk about anodized zinc diecastings. They are going into the research stage in this country. England has completed its first studies and is about to enter pilot operations.

STEEL's Metal Price Averages for April, 1956

(Cents per lb)

Electrolytic Copper, deld. Connecticut	47.500
Lead, St. Louis	15.800
Prime Western Zinc, E. St. Louis, Ill.	13.500
Straits Tin, New York	99.270
Primary Aluminum Ingots, deld.	25.900
Magnesium, Velasco, Tex.	33.150
Nickel, f.o.b. refinery	64.500

Aluminium: Expansion

Aluminium Ltd. is doing it again. President Nathanael V. Davis told stockholders that some $250 million will be spent for the construction of a hydroelectric project (northern Quebec) to support a minimum of 150,000 tons of new aluminum smelting capacity. Says Mr. Davis: "If the rights are obtained and if further study confirms the belief that development will be attractive, construction will begin shortly." The new Quebec expansion, coupled with the construction program at Kitimat, would increase Aluminium's capacity from 650,000 tons (December, 1955) to over 1 million tons by the end of 1959. "Outlook is that we will find a ready market for our future production," predicts Mr. Davis.

Coal for power and clay for bauxite may become the bywords of the aluminum industry. There are indications that the basic process for obtaining alumina from clay has been mastered. It now must be determined what the operating costs will be per ton of alumina produced. If costs can be brought in line, aluminum producers could set up smelters in areas that have both coal and clay.

New Records for Mag

Magnesium primary production totaled 6348 tons in March, reports the Magnesium Association. Wrought product shipments reached an all-time high of 1176 tons, a 24-per-cent gain over February.

Advocates point out that the use of more magnesium diecastings in automobiles is a sure thing for 1957 models. They predict that the metal will continue to show substantial gains in high-temperature and electronic applications, too. Only cloud: There is some concern about the effect recent price hikes may have.

Tin: Supply Equals Demand

The tin market is firm. Prices continue to hover between 98 and 99 cents a pound. It is believed that the government's Texas City smelter will not enter the market for more concentrates for the next two or three months. This will help keep supply and demand in proper balance. Tin men are speculating on how much the U. S. may decide to purchase during the last half of 1956. If the U. S. lets contracts for enough concentrate to keep its smelter going at full tilt, tin could be in short supply during the last half.

Titanium Under Scrutiny

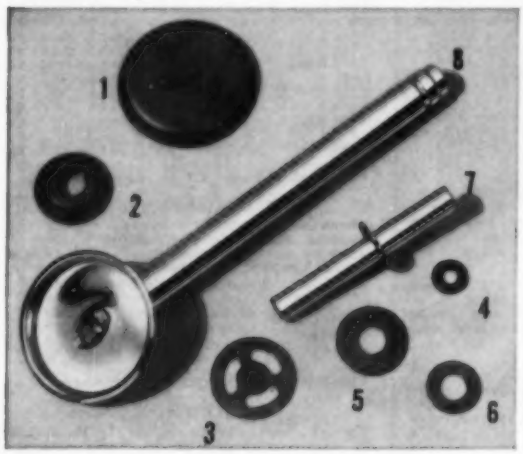
Titanium industry representatives and government officials will get together to solve some of that metal's mysteries. In prospect is a study of production and fabrication techniques aimed at possible adoption by the industry of uniform production and fabrication techniques and equipment.

BRIDGEPORT BRASS COMPANY

COPPER ALLOY BULLETIN

Bridgeport Brass Co.

Reporting new developments in copper-base alloys and metalworking methods.



Manufacturer Finds Technical Service Helps Match Metal to Process and Product

Dishcloth and dishpan may soon become museum relics through continuing advances in the plumbing equipment field. A good example of this progress is the Dish-Quick® detergent dishwashing spray developed by Modern Faucet Mfg. Co. of Los Angeles, makers of plastic and die-cast plumbing specialties.

Their semi-automatic dishwasher (illustrated above) makes it possible to soap, scrub and rinse dishes in half the usual time. Operation and installation of the spray are simple. Press the button and lever simultaneously for rich suds, and follow by pressing just the lever for a clear spray of hot rinse water. Old style trigger sprays can be easily replaced in a few minutes.

Because of the variety of materials needed and the different manufacturing processes involved, Modern Faucet Mfg. Co. asked Bridgeport's metallurgists to help determine exact material specifications for each component of the dishwasher. The manufacturer needed tube that would be easy to polish and plate; brass rod that was free-machining to reduce machine time costs; and brass strip with easy formability.

In addition to meeting the special metalworking requirements of screw machines, eyelet machines, punch presses and induction welding machines, each alloy had to resist corrosion and give quality performance for long product life.

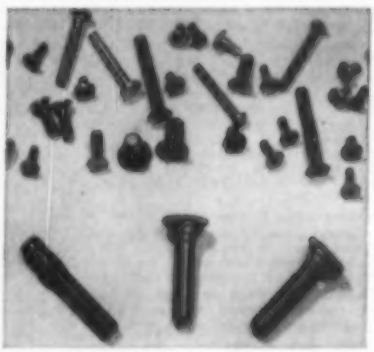
The illustration shows components produced from alloys recommended by Bridgeport Technical Service.

The Spray Face (1) is stamped from 85/15 Red Brass Strip, Bridgeport Alloy F85, as are the Water Valve Packing Retainer (2), Seat Washer Support Disc (3), and Detergent Valve Packing Retainer (4). Also known as Rich Low Brass because of its low zinc content and rich golden color, Alloy F85 was recommended because of its high strength, fine ductility, and resistance to cracking and corrosion. All external parts are chrome plated for durable, lasting beauty.

Tubing (8), which is silver brazed to the Spray Face; Rear Packing Guide (5); and Washer (6) which is silver brazed to Valve Tube (7) are Alloy F37, a 70/30 yellow brass alloy with great strength, a good polishing and plating surface, and high corrosion resistance.

While this article concerns the material selection requirements of one particular manufacturer, the knowledge and skill of Bridgeport metallurgists is also available to you. Bridgeport Technical Service is as near as your typewriter or your telephone. Write direct to our home office or phone your nearest Bridgeport Sales Office.

More Profitable Cold Heading with Bridgeport Alloys



Successful cold heading depends on *metal, temper* and *tooling*. If any one component varies, the other two are affected to a great extent. For this reason, Bridgeport metallurgists have made a special study of the problem of choosing the right metal for use in cold heading. The alloy should be *matched* to the type of part being manufactured and to the tooling. It must have good strength, malleability and correct temper—all essentials for high speed automatic operation.

The temper of the alloy stock is generally determined by the amount of cold working involved and the temper required in the finished part. In the case of Silicon Bronze, Bridgeport Alloy #609, the wire is supplied in the hard-drawn condition, since it is extremely ductile in all tempers, and resists corrosion and stress corrosion cracking. This alloy is finding ever widening applications for outdoor construction where brass and steel are not desirable.

High Brass, Bridgeport Alloy #16 is still the favorite cold-heading wire alloy because of its excellent working properties and its durability as a finished article. It is ideal for all types of machine, wood and cap screws, solid and hollow rivets and special fastenings.

When you are selecting an alloy, remember it costs you nothing to ask your Bridgeport Sales Office for expert metallurgical advice. They will be glad to study your requirements, and recommend a metal that is matched to your job. Call or write for further information on Bridgeport alloys for cold heading. (4624)

Bridgeport Brass Co.

BRIDGEPORT BRASS COMPANY ♦ BRIDGEPORT, CONNECTICUT

Mills at Bridgeport, Conn., Indianapolis, Ind., and Adrian, Mich. Sales Offices in Principal Cities—Conveniently Located Warehouses

Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots, 25.90; pigs, 24.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 27.70; No. 43, 5% Si, 27.50; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 29.70; No. 195, 4.5% Cu, 0.8% Si, 29.10; No. 214, 3.8% Mg, 29.30; No. 356, 7% Si, 0.3% Mg, 27.70.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 46.00 deld. Conn. Valley; 46.00 deld. Midwest; custom smelter, 45.00 deld.; Lake, 46.00 deld.; Fire refined, 45.75 deld.; Chilean electrolytic, 43.06 deld.

Germanium: First reduction, $201.55-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$110 nom. per troy oz.

Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 99 +, cups or ingots, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 33.75 f.o.b. Velasco, Tex.; ingot, 34.50 f.o.b. Velasco, Tex.

Magnesium Alloys: AZ91B (diecasting), 35.00 deld.; AZ63A, AZ92A, AZ91C (sand casting), 39.25 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $268-$271 per 76-lb flask.

Molybdenum: Powder, 99% hydrogen reduced, $3.20 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.66; "XX" nickel shot, 69.00; "P" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $80-$100 per troy oz nom.

Palladium: $23-$24 per troy oz.

Platinum: $97-$110 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $115-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $13.50-$15.50 per lb.

Silver: Open market, 90.75 per troy oz.

Sodium: 16.50, e.l.; 17.00 l.c.l.

Tantalum: Sheet, rod, $66.70 per lb; powder, $56.63 per lb.

Tellurium: $1.60-$1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot 98.125; prompt, 97.875.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $3.45; grade A-2 (0.5% Fe max), $3.15 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.50 per lb, nom, f.o.b. shipping point; less than 1000 lb add 15.00; 99 +% hydrogen reduced, $5.00. Treated ingot, $6.70.

Zinc: Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade, 15.25 deld.

Diecasting alloy ingot No. 2, 18.00; No. 2, 19.00; No. 5, 18.50, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $7.50-$10.00 per lb, depending on quantity; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 27.00-28.00; No. 12 foundry alloy (No. 2 grade), 27.00; 5% silicon alloy, 0.60 Cu max, 28.00-29.25; 13 alloy, 0.60 Cu max, 28.00-29.25; 195 alloy, 2800-29.25; 108 alloy, 26.75-27.50. Steel deoxidizing grades, notch bars, granulated or shot; Grade 1, 26.75-27.50; grade 2, 26.00-26.75; grade 3, 25.25-26.00; grade 4, 24.75-25.50.

Brass Ingot: Red brass, No. 115, 40.50; tin bronze, No. 225, 53.50; No. 245, 46.75; high-leaded tin bronze, No. 305, 43.75; No. 1 yellow, No. 405, 31.75; manganese bronze, No. 421, 36.25.

Magnesium Alloy Ingot: AZ63A, 36.00; AZ91B, 36.00; AZ91C, 36.00; AZ92A, 36.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.92; rod, bar, wire, $1.89.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 51.355; l.c.l., 51.98. Weatherproof, 30,000-lb lots, 48.28; l.c.l., 49.03. Magnet wire deld., 15,000 lb or more, 58.68; l.c.l., 59.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $13.10-$13.60; sheared mill plate, $10.50-$12.00; strip, $13.10-$13.60; wire, $9.50-$11.50; forging billets, $7.90-$8.15; hot-rolled and forged bars, $7.90-$8.15.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 24.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R.	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes, H.R.	87	74	93
Seamless Tubes	122	110	153

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	69.4	67.9	...	...
0.156-0.172	59.0	57.4	...	...
0.188	59.0	57.4	...	73.2
0.219-0.234	56.0	54.4	...	...
0.250-0.281	56.0	54.4	...	69.9
0.313	56.0	54.4	...	66.7
Cold-finished				
0.375-0.547	54.9	52.9	65.2	62.8
0.563-0.688	54.9	52.9	62.1	59.0
0.750-1.000	53.6	51.6	56.9	55.7
1.063	53.6	51.6	...	53.8
1.125-1.500	51.6	49.7	55.1	53.8
Rolled				
1.563	50.3	48.4	...	...
1.625-2.000	49.7	47.7	...	52.0
2.125-2.500	48.5	46.5	...	...
2.563-3.375	47.1	45.1	...	...

ALUMINUM

Sheet and Circle: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circles†
0.249-0.136	39.0	43.8	...	...
0.135-0.096	39.5	44.7	27.5	42.4
0.095-0.077	40.2	45.7	37.6	42.8
0.076-0.061	40.8	46.6	37.8	43.0
0.060-0.048	41.4	47.1	38.2	43.5
0.047-0.038	41.9	48.0	38.7	43.9
0.037-0.030	42.3	48.5	39.1	44.6
0.029-0.024	42.9	49.0	39.4	45.1
0.023-0.019	43.7	50.5	40.3	46.0
0.018-0.017	44.5	...	40.9	46.9
0.016-0.015	45.4	...	41.7	48.1
0.014	46.4	...	42.7	49.4
0.013-0.012	47.6	...	43.4	50.4
0.011	48.6	...	44.6	52.0
0.010-0.0096	49.9	...	45.8	53.7
0.009-0.0085	51.2	...	47.3	55.8
0.008-0.0075	52.8	...	48.5	57.6
0.007	54.3	...	50.0	59.9
0.006	55.9	...	51.4	64.9

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	38.0	42.3
5050-F	39.1	43.4
3004-F	40.1	45.3
5052-F	41.4	46.7
6061-T6	42.6	47.5
2024-T4*	45.1	51.4
7075-T6*	52.9	60.0

*24-48 in. widths or diam, 72-180 lengths.

ALUMINUM

Forging Stock: Round, Class 1, 40.60-51.60 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 44.50-57.70 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, 20-ft length, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
⅜	$17.45	2	$ 53.85
1	27.35	4	148.60
1¼	37.05	6	286.55
1½	44.30	8	401.10

MAGNESIUM

Sheet and Plate: AZ31A standard grade, .032 in., 100.00; .081 in., 75.00; .188 in., 66.50; .250-2.0 in., 65.60. AZ31A special grade, .032 in., 163.10; .081 in., 103.50; .188 in., 91.10; .250-2.0, 88.90. Tread plate, .188 in., 68.90; .250-2.0 in., 67.80. Tooling plate, .250-3.0 in., 70.20.

Extruded Solid Shapes:

Factor	Com. Grade (FS)	Spec. Grade (AZ31B)
6-8	66.40-69.00	81.40-84.00
12-14	67.50-69.60	82.50-84.60
24-26	72.10-72.70	87.10-87.70
36-38	84.90-85.80	99.90-100.80

NONFERROUS SCRAP

DEALERS BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 18.00-18.50; old sheets, 16.50-17.00; borings and turnings 10.00-10.50; crankcases, 16.50-17.00; industrial castings, 15.50-16.00.

Copper and Brass: No. 1 heavy copper and wire, 34.50-35.00; No. 2 heavy copper and wire, 32.50-33.00; light copper, 30.00-30.50; No. 1 composition red brass, 28.00-28.50; No. 1 composition turnings, 27.00-27.50; yellow brass

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	68.63b	65.86c	....	68.82	43.500	43.500	42.750
Yellow Brass	56.60	46.58d	57.14	59.51	32.250	32.000	29.875
Low Brass, 80%	61.35	61.29	61.89	64.16	36.625	36.375	35.875
Red Brass, 85%	63.07	63.01	63.61	65.88	38.250	38.000	37.500
Com. Bronze, 90%	65.33	65.27	65.87	67.89	39.875	39.625	39.125
Manganese Bronze	63.54-63.66	57.52-57.64	67.99	....	30.250	30.000	29.500
Muntz Metal	57.84	53.65	....	....	30.125	29.875	29.375
Naval Brass	59.60-59.80	54.11	66.86	62.96	29.875	29.625	29.125
Silicon Bronze	71.92	71.11	71.96	74.13e	42.250	42.000	41.250
Nickel Silver, 10%	70.17	72.41g	72.41	....	35.625	35.375	17.813
Phos. Bronze, A, 5%	86.79	87.29	87.29	88.47	44.000	43.750	42.750

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. Based on copper at 47.5 cents a pound. g. Leaded

turnings, 17.50-18.50; new brass clippings, 24.50-25.00; light brass, 16.50-17.00; heavy yellow brass, 19.00-19.50; new brass rod ends, 23.00-24.00; auto radiators, unsweated, 20.00-20.50; cocks and faucets, 22.00-22.50; brass pipe, 21.50-22.00.

Lead: Heavy, 12.50-13.00; battery plates, 6.50-7.25; linotype and stereotype, 14.00-15.50; electrotype, 13.00-13.75; mixed babbitt, 15.50.

Magnesium: Clippings, 18.50-19.50; clean castings, 18.00-19.00; iron castings, not over 10% removable Fe, less full deduction for Fe, 16.00-17.00.

Monel: Clippings, 65.00-90.00; old sheets, 65.00-80.00; turnings 65.00-70.00; rods, 65.00-90.00.

Nickel: Sheets and clips, 100.00-200.00; rolled anodes, 100.00-200.00; turnings, 85.00-185.00; rod ends, 100.00-200.00.

Zinc: Old zinc, 5.50-6.00; new die-cast scrap, 5.50; old die-cast scrap, 3.00.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 19.75-20.50; 3003 clippings, 19.50-20.50; 6151 clippings, 19.50-20.50; 5052 clippings, 19.50-20.50; 2014 clippings, 19.50-20.00; 2017 clippings, 19.50-20.00; 2024 clippings, 19.50-20.00; mixed clippings, 19.00-20.00; old sheet, 17.50-18.50; old cast, 17.50-18.50; clean old cable (free of steel), 19.25-20.50; borings and turnings, 17.00-19.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 68.00; light scrap, 63.00; turnings and borings, 48.00.

Copper and Brass: No. 1 heavy copper and wire, 36.00; No. 2 heavy copper and wire, 35.50; light copper, 32.00; refinery brass (60% coper) per dry copper content, 32.00.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 36.00; No. 2 heavy copper and wire, 35.50; light copper, 32.00; No. 1 composition borings, 29.00-29.50; No. 1 composition solids, 29.50-30.00; heavy yellow brass solids, 20.00-20.50; yellow brass turnings, 19.50; radiators, 21.00-21.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 65.29; oval, 64.42, 5000-10,000 lb; electrodeposited, 61.25, 2000-5000 lb lots; cast 60.54, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery, effective Jan. 1, 1955.

Tin: Bar or slab, less than 200 lb, $1.165; 200-499 lb, $1.150; 500-999 lb, $1.145; 1000 lb or more, $1.140.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

Copper Cyanide: 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 83.50; 1000 lb, 81.50.

Copper Cyanide: 100 lb 85.25; 200 lb, 84.50; lb, 15.90; 6000 lb or more, 15.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 42.50; 400-4900 lb, 41.50; 5000-9900 lb, 39.50; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.35. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 86.875; 15-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb, and over, 17.80; granular, add 1-cent premium to above.

Sodium Stannate: Less than 100 lb, 70.40; 100-600 lb, 62.00; 700-1900 lb, 59.50; 2000-9900 lb, 57.80; 10,000 lb or more, 56.60.

Stannous Chloride (anhydrous): Less than 25 lb, $1.671; 25 lb, $1.321; 100 lb, $1.171; 400 lb, $1.147; 5200-19,600, $1.025; 20,000 lb or more, 90.30.

Stannous Sulphate: Less than 50 lb, $1.298; 50 lb, 99.80; 100-1900 lb, 97.80; 2000 lb or more, 95.80.

Zinc Cyanide: Under 1000 lb, 54.30; 1000 lb and over, 52.30.

Here's A Curly Cue
To New Market Value
For Your Machine Turnings

American METAL TURNINGS Crusher

That single machine turning of curled-up steel shown above can be mighty troublesome and costly to your operations.

Gnarled up with thousands of others like itself, it becomes a problem in space . . . gallons of re-usable cutting oil are trapped in the folds . . . and the scrap value is greatly minimized.

Answer? Run this tangled waste through an efficient, AMERICAN METAL TURNINGS CRUSHER. Out come sized ships that are easy to handle for shoveling or pneumatic handling . . . easy to store (savings in space up to 75%) . . . easy to spin for oil recovery . . . and crushed turnings command a higher price.

The cost is easy, too, on your scrap recovery program. Pays for itself. WRITE for illustrated literature.

RECLAIM FUSED WELDING FLUX
American Hammermill reduces fused flux to fine regranulation for perfect re-use. Why throw away profits! Details on request.

WRITE for Coal Crushing Bulletin

American PULVERIZER COMPANY
Designers and Manufacturers of Ring Crushers and Pulverizers
1539 MACKLIND AVE. • ST. LOUIS 10, MO.

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 151; to footnotes, page 153.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5	$65.50

INGOTS, Alloy (NT)

Detroit R7	$69.00
Houston S5	74.00
Midland,Pa. C18	69.00
Munhall,Pa. U5	69.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Aliquippa,Pa. J5	$68.50
Bessemer,Pa. U5	68.50
Bridgeport,Conn. N19	73.50
Buffalo R2	68.50
Clairton,Pa. U5	68.50
Ensley,Ala. T2	68.50
Fairfield,Ala. T2	68.50
Fontana,Calif. K1	78.00
Gary,Ind. U5	68.50
Johnstown,Pa. B2	68.50
Lackawanna,N.Y. B2	68.50
LoneStar,Tex. L6	74.50
Munhall,Pa. U5	68.50
Pittsburgh J5	68.50
S.Chicago,Ill. R2, U5	68.50
S.Duquesne,Pa. U5	68.50
Youngstown R2	68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5	$84.50
Bessemer,Pa. U5	84.50
Bridgeport,Conn. N19	89.50
Buffalo R2	84.50
Canton,O. R2	86.50
Clairton,Pa. U5	84.50
Conshohocken,Pa. A3	89.50
Ensley,Ala. T2	84.50
Fairfield,Ala. T2	84.50
Fontana,Calif. K1	94.00
Gary,Ind. U5	84.50
Geneva,Utah C11	84.50
Houston S5	101.00
Johnstown,Pa. B2	84.50
Lackawanna,N.Y. B2	84.50
LosAngeles B3	94.00
Midland,Pa. C18	84.50
Munhall,Pa. U5	84.50
Pittsburgh J5	84.50
Seattle B3	98.00
S.Chicago R2,U5,W14	84.50
S.Duquesne,Pa. U5	84.50
S.SanFrancisco B3	94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2	$96.00
Buffalo R2	96.00
Canton,O. R2, T7	96.00
Conshohocken,Pa. A3	103.00
Detroit R7	96.00
Fontana,Calif. K1	117.00
Gary,Ind. U5	96.00
Houston S5	105.00
Ind.Harbor,Ind. Y1	96.00
Johnstown,Pa. B2	96.00
Lackawanna,N.Y. B2	96.00
LosAngeles B3	116.00
Massillon,O. R2	96.00
Midland,Pa. C18	96.00
Munhall,Pa. U5	96.00
S.Chicago R2,U5,W14	96.00
S.Duquesne,Pa. U5	96.00
Struthers,O. Y1	96.00
Warren,O. C17	96.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2	$103.50
Canton,O. R2	103.50
Cleveland R2	103.50
Gary,Ind. U5	103.50
S.Chicago R2, W14	103.50
S.Duquesne,Pa. U5	103.50

SKELP

Aliquippa,Pa. J5	4.325
LoneStar,Tex. L6	4.625
Munhall,Pa. U5	4.225
SparrowsPoint,Md. B2	4.225
Warren,O. R2	4.225
Youngstown R2, U5	4.225

WIRE RODS

AlabamaCity,Ala. R2	5.375
Aliquippa,Pa. J5	5.375
Alton,Ill. L1	5.55
Buffalo W12	5.375
Cleveland A7	5.375
Donora,Pa. A7	5.375
Fairfield,Ala. T2	5.375
Houston S5	5.625
IndianaHarbor,Ind. Y1	5.375
Johnstown,Pa. B2	5.375
Joliet,Ill. A7	5.375
KansasCity,Mo. S5	5.625
Kokomo,Ind. C16	5.475
Los Angeles B3	6.175
Minnequa,Colo. C16	5.625
Monessen,Pa. P7	5.375
N.Tonawanda,N.Y. B11	5.375
Pittsburg,Calif. C11	6.025
Portsmouth,O. P12	5.375
Roebling,N.J. R5	5.475
S.Chicago,Ill. R2	5.375
SparrowsPoint,Md. B2	5.475
Sterling,Ill.(1) N15	5.375
Sterling,Ill. N15	5.475
Struthers,O. Y1	5.375
Worcester,Mass. A7	5.675

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2	4.60
Aliquippa,Pa. J5	4.60
Bessemer,Ala. T2	4.60
Bethlehem,Pa. B2	4.65
Birmingham C15	5.10
Clairton,Pa. U5	4.60
Fairfield,Ala. T2	4.60
Fontana,Calif. K1	5.30
Gary,Ind. U5	4.60
Geneva,Utah C11	4.60
Houston S5	4.70
Ind.Harbor,Ind. I-2	4.60
Johnstown,Pa. B2	4.65
KansasCity,Mo. S5	4.70
Lackawanna,N.Y. B2	4.65
LosAngeles B3	5.30
Minnequa,Colo. C10	4.90
Munhall,Pa. U5	4.60
Niles,Calif. P1	5.25
Phoenixville,Pa. P4	5.15
Portland,Oreg. O4	5.35
Seattle B3	5.35
S. Chicago U5, W14	4.60
S.SanFrancisco B3	5.25
Torrance,Calif. C11	5.30
Weirton,W.Va. W6	4.60

Wide Flange

Bethlehem,Pa. B2	4.65
Clairton,Pa. U5	4.60
Fontana,Calif. K1	5.45
Lackawanna,N. Y. B2	4.65
Munhall,Pa. U5	4.60
Phoenixville,Pa. P4	5.15
S.Chicago,Ill. U5	4.60

Alloy Std. Shapes

Clairton,Pa. U5	5.65
Fontana,Calif. K1	7.40
Gary,Ind. U5	5.65
Houston S5	5.75
Munhall,Pa. U5	5.65
S.Chicago,Ill. U5	5.65

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5	6.75
Bessemer,Ala. T2	6.75
Bethlehem,Pa. B2	6.80
Clairton,Pa. U5	6.75
Fairfield,Ala. T2	6.75
Fontana,Calif. K1	7.45
Gary,Ind. U5	6.75
Geneva,Utah C11	6.75
Houston S5	6.85
Ind.Harbor,Ind. I-2, Y1	6.75
Johnstown,Pa. B2	6.80
KansasCity,Mo. S5	6.85
Lackawanna,N.Y. B2	6.80
LosAngeles B3	7.45
Munhall,Pa. U5	6.75
Seattle B3	7.50
S.Chicago,Ill. U5, W14	6.75
S.SanFrancisco B3	7.40
Struthers,O. Y1	6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2	6.80
Lackawanna,N.Y. B2	6.80
Munhall,Pa. U5	6.75
S.Chicago,Ill. U5	6.75

PILING

BEARING PILES

Bethlehem,Pa. B2	4.65
Lackawanna,N.Y. B2	4.65
Munhall,Pa. U5	4.60
S.Chicago,Ill. U5	4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2	5.45
Lackawanna,N.Y. B2	5.45
Munhall,Pa. U5	5.45
S.Chicago,Ill. U5	5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Ashland,Ky.(15) A10	4.50
Bessemer,Ala. T2	4.50
Bridgeport,Conn. N19	4.75
Buffalo R2	4.50
Clairton,Pa. U5	4.50
Claymont,Del. C22	*5.35*
Cleveland J5, R2	4.60
Coatesville,Pa. L7	4.80
Conshohocken,Pa. A3	4.50
Detroit M1	4.60
Ecorse,Mich. G5	4.60
Fairfield,Ala. T2	4.50
Fontana,Calif.(30) K1	5.20
Gary,Ind. U5	4.50
Geneva,Utah C11	4.50
GraniteCity,Ill. G4	4.70
Harrisburg,Pa. P4	5.10
Houston S5	4.60
Ind.Harbor, Ind. I-2, Y1	4.50
Johnstown,Pa. B2	4.50
Lackawanna,N.Y. B2	4.50
LoneStar,Tex. L6	4.85
Mansfield,O. E6	4.50
Minnequa,Colo. C10	5.35
Munhall,Pa. U5	4.50
Newport,Ky. N9	4.50
Pittsburgh J5	4.50
Riverdale,Ill. A1	4.725
Seattle B3	5.40
Sharon,Pa. S3	4.50
S.Chicago R2, U5, W14	4.50
SparrowsPoint,Md. B2	4.50
Steubenville,O. W10	4.50
Warren,O. R2	4.50
Weirton,W.Va. W6	4.50
Youngstown R2, U5, Y1	4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22	*6.20*
Fontana,Calif. K1	6.35
Geneva,Utah C11	5.65
Johnstown,Pa. B2	5.65
SparrowsPoint,Md. B2	5.65

PLATES, Wrought Iron

Economy,Pa. B14	10.40

PLATES, High Strength Low-Alloy

Aliquippa,Pa. J5	6.725
Bessemer,Ala. T2	6.725
Clairton,Pa. U5	6.725
Cleveland J5, R2	6.725
Claymont,Del. C22	6.725
Coatesville,Pa. L7	7.025
Conshohocken,Pa. A3	6.725
Ecorse,Mich. G5	6.825
Fairfield,Ala. T2	6.725
Fontana,Calif.(30) K1	7.425
Gary,Ind. U5	6.725
Geneva,Utah C11	6.725
Houston S5	6.825
Ind.Harbor,Ind. I-2, Y1	6.725
Johnstown,Pa. B2	6.725
Munhall,Pa. U5	6.725
Pittsburgh J5	6.725
Seattle B3	7.625
Sharon,Pa. S3	6.725
S.Chicago,Ill. U5, W14	6.725
SparrowsPoint,Md. B2	6.725
Warren,O. R2	6.725
Youngstown U5, Y1	6.725

PLATES, Alloy

Bridgeport,Conn. N19	6.55
Claymont,Del. C22	6.30
Coatesville,Pa. L7	6.30
Fontana,Calif. K1	7.00
Gary,Ind. U5	6.30
Houston S5	6.40
Ind.Harbor,Ind. Y1	6.30
Johnstown,Pa. B2	6.30
Munhall,Pa. U5	6.30
Newport,Ky. N9	6.30
Seattle B3	7.20
Sharon,Pa. S3	6.30
S.Chicago,Ill. U5, W14	6.30
SparrowsPoint,Md. B2	6.30
Youngstown Y1	6.30

FLOOR PLATES

Cleveland J5	5.575
Conshohocken,Pa. A3	5.575
Harrisburg,Pa. P4	5.575
Ind.Harbor,Ind. I-2	5.575
Munhall,Pa. U5	5.575
S.Chicago,Ill U5	5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10	4.75
Ashland,l.c.l. (15) A10	5.25
Cleveland c.l. R2	5.10
Warren,O. c.l. R2	5.10

BARS

BARS, Hot-Rolled Carbon (Commercial Quality)

Ala.City,Ala.(9) R2	4.65
Aliquippa,Pa.(9) J5	4.65
Alton,Ill. L1	4.85
Atlanta A11	4.85
Bessemer,Ala.(9) T2	4.65
Birmingham C15	5.15
Bridgeport,Conn. N19	4.80
Buffalo(9) R2	4.65
Canton,O.(9) R2	4.75
Clairton,Pa.(9) U5	4.65
Cleveland(9) R2	4.65
Ecorse,Mich.(9) G5	4.75
Emeryville,Calif. J7	5.40
Fairfield,Ala.(9) T2	4.65
Fairless,Pa.(9) U5	4.80
Fontana,Calif. K1	5.35
Gary,Ind.(9) U5	4.65
Houston(9) S5	4.90
Ind.Harbor,Ind.(9) I-2,	4.65
Ind.Harbor,Ind. Y1	4.65
Johnstown,Pa.(9) B2	4.65
Joliet,Ill. P22	5.15
KansasCity,Mo.(9) S5	4.90
Lackawanna(9) B2	4.65
LosAngeles(9) B3	5.35
Massillon,O.(9) R2	4.75
Midland,Pa.(9) C18	4.65
Milton,Pa. M18	4.80
Minnequa,Colo. C10	5.10
Niles,Calif. P1	5.35
N.T'wanda,N.Y.(9) B11	4.65
Pittsburg,Calif.(9) C11	5.35
Pittsburgh(9) J5	4.65
Portland,Oreg. O4	5.40
Seattle B3 N14	5.40
S.Chicago W14	4.65
S.Chicago,Ill.(9) R2, U5	4.65
S.Duquesne,Pa.(9) U5	4.65
S.SanFran.,Calif.(9) B3	5.40
Sterling,Ill.(1) N15	4.65
Sterling,Ill. N15	4.75
Struthers,O. Y1	4.65
Torrance,Calif.(9) C11	5.35
Warren,O.(9) R2	4.65
Weirton,W.Va.(9) W6	4.65
Youngstown(9) R2, U5	4.65

BARS, H.R. Loaded Alloy

Warren,O. C17	6.575

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2	5.575
Bridgeport,Conn. N19	5.725
Buffalo R2	5.575
Canton,O. R2, T7	5.575
Clairton,Pa. U5	5.575
Detroit R7	5.575
Ecorse,Mich. G5	5.675
Fairless,Pa. U5	5.725
Fontana,Calif. K1	6.625
Gary,Ind. U5	5.575
Houston S5	5.825
Ind.Harbor,Ind. I-2, Y1	5.575
Johnstown,Pa. B2	5.575
KansasCity,Mo. S5	5.825
Lackawanna,N.Y. B2	5.575
LosAngeles B3	6.625
Massillon,O. R2	5.575
Midland,Pa. C18	5.575
S.Chicago R2, U5, W14	5.575
S.Duquesne,Pa. U5	5.575
Struthers,O. Y1	5.575
Warren,O. C17	5.575
Youngstown U5	5.575

BARS & SMALL SHAPES, H.S. High-Strength Low-Alloy

Aliquippa,Pa. J5	6.80
Bessemer,Ala. T2	6.80
Bethlehem,Pa. B2	6.80
Clairton,Pa. U5	6.80
Cleveland R2	6.80
Ecorse,Mich. G5	6.90
Fairfield,Ala. T2	6.80
Fontana,Calif. K1	7.50
Gary,Ind. U5	6.80
Houston S5	7.05
Ind.Harb.,Ind. I-2, Y1	6.80
Johnstown,Pa. B2	6.80
KansasCity,Mo. S5	7.05
Lackawanna,N.Y. B2	6.80
LosAngeles B3	7.50
Pittsburgh J5	6.80
Seattle B3	7.55
S.Chicago W14	6.80
S.Duquesne,Pa. U5	6.80
S.SanFrancisco B3	7.55
Struthers,O. Y1	6.80
Warren,O. R2	6.80
Youngstown U5	6.80

BAR SIZE ANGLES, H.R. Carbon

Bethlehem,Pa.(9) B2	4.80
Lackawanna(9) B2	4.65

BAR SIZE ANGLES, S. Shapes

Aliquippa,Pa. J5	4.65
Atlanta A11	4.85
Fontana,Calif. K1	5.35
Joliet,Ill. P22	5.10
Niles,Calif. P1	5.35
Pittsburgh J5	4.65
Portland,Oreg. O4	5.40
SanFrancisco S7	5.05

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5	5.65
Gary,Ind. U5	5.65
Houston S5	5.90
KansasCity,Mo. S5	5.90
Youngstown U5	5.65

BARS, C.F. Loaded Alloy

Ambridge,Pa. W18	8.325
Camden,N.J. P13	8.35
Chicago W18	8.325
Cleveland C20	8.325
Monaca,Pa. S17	8.325
Newark,N.J. W18	8.50
SpringCity,Pa. K3	8.30
Warren,O. C17	8.575

BARS, Cold-Finished Carbon

Ambridge,Pa. W18	6.25
BeaverFalls,Pa. M12,R2	6.25
Buffalo B5	6.30
Camden,N.J. P13	6.70
Carnegie,Pa. C12	6.25
Chicago W18	6.25
Cleveland A7, C20	6.25
Detroit B5, P17	6.45
Detroit R7	6.25
Donora,Pa. A7	6.25
Elyria,O. W8	6.25
FranklinPark,Ill. N8	6.25
Gary,Ind. R2	6.25
GreenBay,Wis. F7	6.25
Hammond,Ind. L2, M13	6.25
Hartford,Conn. R2	6.75
Harvey,Ill. B5	6.25
LosAngeles(49) S30	7.70
LosAngeles R2	7.70
Mansfield,Mass. B5	6.80
Massillon,O. R2, R8	6.25
Midland,Pa. C18	6.25
Monaca,Pa. S17	6.25
Newark,N.J. W18	6.70
NewCastle,Pa.(17) B4	6.25
Pittsburgh J5	6.25
Plymouth,Mich. P5	6.50
Putnam,Conn. W18	6.80
Readville,Mass. C14	6.80
S.Chicago,Ill. W14	6.25
SpringCity,Pa. W3	6.70
Struthers,O. Y1	6.25
Waukegan,Ill. A7	6.25
Worcester,Mass. W19	6.70
Youngstown F3, Y1	6.25

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19	5.16

BARS, Cold-Finished Alloy

Ambridge,Pa. W18	7.425
BeaverFalls,Pa. M12,R2	7.425
Bethlehem,Pa. B2	7.425
Buffalo B5	7.425
Camden,N.J. P13	7.60
Canton,O. T7	7.425
Carnegie,Pa. C12	7.425
Chicago W18	7.425
Cleveland A7, C20	7.425
Detroit R7	7.425
Detroit B5, P17	7.625
Donora,Pa. A7	7.425
Elyria,O. W8	7.425
Gary,Ind. R2	7.425
GreenBay,Wis. F7	7.425
Hammond,Ind. L2, M13	7.425
Hartford,Conn. R2	7.725
Harvey,Ill. B5	7.425
Lackawanna,N.Y. B2	7.425
LosAngeles S30	9.10
Mansfield,Mass. B5	7.725
Massillon,O. R2, R8	7.425
Midland,Pa. C18	7.425
Monaca,Pa. S17	7.425
Newark,N.J. W18	7.60
Plymouth,Mich. P5	7.625
S.Chicago W14	7.425
SpringCity,Pa. K3	7.60
Struthers,O. Y1	7.425
Warren,O. C17	7.425
Waukegan,Ill. A7	7.425
Worcester,Mass. A7	7.725
Youngstown F3, Y1	7.425

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2	4.65
Atlanta A11	4.85
Birmingham C15	5.15
Buffalo R2	4.65
Cleveland R2	4.65
Ecorse,Mich. G5	4.75
Emeryville,Calif. J7	5.40
Fairfield,Ala. T2	4.65
Fairless,Pa. U5	4.80
Fontana,Calif. K1	5.35
Ft.Worth,Tex.(42) T4	5.10
Gary,Ind. U5	4.65
Houston S5	4.90

Ind.Harbor,Ind. I-2, Y1 .4.65
Johnstown,Pa. B2 .....4.65
Joliet,Ill. P22 .....5.15
KansasCity,Mo. S5 .....4.90
Lackawanna,N.Y. B2 ..4.65
LosAngeles B3 .....5.35
Milton,Pa. M18 .....4.80
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.35
Pittsburg,Calif. C11 ....5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 .....5.40
SandSprings,Okla. S5 ..5.15
Seattle B3, N14 .....5.40
S.Chicago R2 .....4.65
S.Duquesne,Pa. U5 ....4.65
S.SanFrancisco B3 .....5.40
SparrowsPoint,Md. B2 ..4.65
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill. N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif. C11 ....5.35
Youngstown R2, U5 ....4.65

BARS, Reinforcing
(Fabricated; to Consumers)

Johnstown,Pa. ½-1" B2 .6.15
KansasCity,Kans. S5 ...6.45
Lackawanna,N.Y. B2 ..6.17
Marion,O. P11 .....6.15
Pittsburgh U8 .....6.17
Seattle B3, N14 .....6.60
SparrowsPt. ½-1" B2 ..6.15
Williamsport,Pa. S19 ...6.00

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2. .4.65
ChicagoHts.(4) C2, I-2. .4.65
Ft.Worth,Tex.(26) T4 ..5.10
Franklin,Pa.(3) F5 ....4.65
Franklin,Pa.(4) F5 ....4.65
JerseyShore,Pa.(4) J8 ..4.65
Marion,O.(3) P11 .....4.65
Moline,Ill.(3) R2 .....4.80
Tonawanda(3) B12 ....5.15
Tonawanda(4) B12 ....5.15
Williamsport,Pa.(3) S19 .4.65

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 11.50
Economy,Pa.(D.R.)B14 14.30
Economy(Staybolt)B14, 14.65
McK.Rks.(S.R.) L5 ...11.50
McK.Rks.(D.R.) L5 ...16.00
McK.Rks.(Staybolt) L5 .17.00

SHEETS

SHEETS, Hot-Rolled Steel
(18 Gage and Heavier)

Ala.City,Ala. R2 .....4.325
Allenport,Pa. P7 .....4.325
Ashland,Ky.(8) A10 ..4.325
Cleveland J5, R2 ....4.325
Conshohocken,Pa. A3 ..4.375
Detroit(8) M1 .....4.425
Dravosburg,Pa. U5 ....4.325
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 ....4.325
Fairless,Pa. U5 .....4.375
Fontana,Calif. K1 ....5.125
Gary,Ind. U5 .....4.325
Geneva,Utah C11 .....4.425
GraniteCity,Ill. G4 ....4.525
Ind.Harbor,Ind. I-2,Y1..4.325
Lackawanna,N.Y. B2 ..4.325
Mansfield,O. E6 (37) ..4.325
Munhall,Pa. U5 .....4.325
Newport,Ky.(8) N9 ...4.325
Niles,O. M21 .....4.325
Pittsburg,Calif. C11 ...5.025
Pittsburgh J5 .....4.325
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 .....4.55
Sharon,Pa. S3 .....4.325
S.Chicago Ill. W14 ....4.325
SparrowsPoint,Md. B2..4.325
Steubenville,O. W10 ...4.325
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5, Y1 ...4.325

SHEETS, H.R. (19 Ga. & Lighter)

Ala.City,Ala. R2 .....5.625
Niles,O. M21 .....5.325

SHEETS, H.R. Alloy

Ind.Harbor,Ind. Y1 ....7.20
Youngstown Y1 .....7.20

SHEETS, H.R. (14 Ga. & Heavier)
High-Strength Low-Alloy

Cleveland J5, R2 .....6.375
Conshohocken,Pa. A3 ..6.425
Dravosburg,Pa. U5 ....6.375
Ecorse,Mich. G5 .....6.475
Fairfield,Ala. T2 .....6.375
Fairless,Pa. U5 .....6.425
Fontana,Calif. K1 .....7.175
Gary,Ind. U5 .....6.375
Ind.Harbor,Ind. I-2, Y1.6.375
Lackawanna(35) B2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
Sharon,Pa. S3 .....6.375
S.Chicago Ill. U5 .....6.375
SparrowsPoint(36) B2..6.375
Warren O. R2 .....6.375
Youngstown U5, Y1 ...6.375

SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland,Ky.(8) A10 ...4.575
Ind.Harbor,Ind. I-2 ...4.575

SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport,Pa. P7 .....5.325
Cleveland J5, R2 .....5.325
Conshohocken,Pa. A3 ..5.375
Dravosburg,Pa. U5 ....5.325
Detroit M1 .....5.325
Ecorse,Mich. G5 .....5.425
Fairfield,Ala. T2 .....5.325
Fairless,Pa. U5 .....5.375
Follansbee,W.Va. F4 ..5.325
Fontana,Calif. K1 ....6.525
Gary,Ind. U5 .....5.325
GraniteCity,Ill. G4 ....5.525
Ind.Harbor,Ind. I-2, Y1.5.325
Lackawanna,N.Y. B2 ..5.325
Mansfield,O. E6 .....5.325
Middletown,O. A10 ....5.325
Newport,Ky. N9 .....5.325
Pittsburg,Calif. C11 ..6.275
Pittsburgh J5 .....5.325
Portsmouth,O. P12 ....5.325
SparrowsPoint,Md. B2..5.325
Steubenville,O. W10 ...5.325
Warren,O. R2 .....5.325
Weirton,W.Va. W6 ....5.325
Youngstown Y1 .....5.325

SHEETS, Cold-Rolled
High-Strength Low-Alloy

Cleveland J5, R2 .....7.875
Dravosburg,Pa. U5 ....7.875
Ecorse,Mich. G5 .....7.975
Fairless,Pa. U5 .....7.925
Fontana,Calif. K1 ....9.075
Gary,Ind. U5 .....7.875
IndianaHarbor,Ind. Y1.7.875
Lackawanna(37) B2 ...7.875
Pittsburgh J5 .....7.875
SparrowsPoint(38) B2..7.875
Warren,O. R2 .....7.875
Weirton,W.Va. W6 ....7.875
Youngstown Y1 .....7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown,O. A10 ....5.825

SHEETS, Culvert (16 Gage)	Cu Alloy	Cu Fe
Ashland,Ky. A10	6.90	...
Canton,O. R2	6.10	6.55
Dravosburg U5	6.10	...
Fairfield T2	6.10	...
Gary Ind. U5	6.10	6.35
Ind.Harbor I-2	6.10	6.35
Kokomo,Ind. C16	6.20	...
MartinsFry. W10	6.10	...
Newport,Ky. N9	6.10	6.35
Pitts.,Calif. C11	6.85	...
SparrowsPt. B2	6.10	...

SHEETS, Culvert—Pure Iron

Ashland,Ky. A10 .....7.15
Gary,Ind. U5 .....6.35
MartinsFry,O. W10 ....6.35

SHEETS, Galvanized Steel
Hot-Dipped

Ala.City,Ala. R2 .....5.85†
Ashland,Ky. A10 .....5.85†
Canton,O. R2 .....5.85‡
Dover,O. R1 .....5.85†
Dravosburg,Pa. U5 ....5.85†
Fairfield,Ala. T2 .....5.85†
Gary,Ind. U5 .....5.85*
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind. I-2 ...5.85†
Kokomo,Ind. C16 .....5.95‡
MartinsFerry,O. W10 ..5.85*
Middletown,O. A10 ....5.85†
Newport,Ky. N9 .....5.85‡
Pittsburg,Calif. C11 ...6.60*
Pittsburgh J5 .....5.85†
SparrowsPt.,Md. B2 ...5.85†
Warren,O. R2 .....5.85†
Weirton,W.Va. W6 ...5.85*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 .....6.625

SHEETS, Galvanized
High-Strength Low-Alloy

Dravosburg,Pa. U5 ....8.60
SparrowsPoint(39) B2 ..8.60

SHEETS, Galvanneal Steel

Canton,O. R2 .....6.25
Dravosburg,Pa. U5 ....6.25
Kokomo,Ind. C16 .....6.60
Newport,Ky. N9 .....6.25

SHEETS, Galvanized Ingot Iron
(Hot-dipped Continuous)

Ashland,Ky. A10 .....6.10
Middletown,O. A10 .....6.10

SHEETS, Electrogalvanized

Cleveland(28) R2 .....6.70
Niles,O.(28) R2 .....6.70
Weirton,W.Va. W6 .....6.55

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) .8.50
Butler,Pa. A10 (type 2) .8.60

SHEETS, Enameling Iron

Ashland,Ky. A10 .....5.90
Cleveland R2 .....5.90
Dravosburg,Pa. U5 ....5.90
Gary,Ind. U5 .....5.90
GraniteCity,Ill. G4 ....6.10
Ind.Harbor,Ind. I-2 ...5.90
Middletown,O. A10 ....5.90
Niles,O. M21 .....5.90
Youngstown Y1 .....5.90

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...7.75
Ind.Harbor,Ind. I-2 ....7.75
Yorkville,O. W10 .....7.75

SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom,W.Va. W10 6.25
Gary,Ind. U5 .....6.25
Mansfield,O. E6 .....6.25
Middletown,O. A10 ....6.25
Niles,O. M21 .....6.25
Weirton,W.Va. W6 .....6.25

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 .....6.65

Key To Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Josiyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine& Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New Eng. High Carb. Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Div., H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.325
Allenport,Pa. P7	4.325
Alton,Ill. L1	4.50
Ashland,Ky.(8) A10	4.325
Atlanta A11	4.525
Bessemer,Ala. T2	4.325
Birmingham C15	4.825
Bridgeport,Conn. N19	4.625
Buffalo(27) R2	4.325
Conshohocken,Pa. A3	4.375
Detroit M1	4.425
Ecorse,Mich. G5	4.425
Fairfield,Ala. T2	4.325
Fontana,Calif. K1	5.125
Gary,Ind. U5	4.325
Ind.Harbor,Ind. I-2,Y1	4.325
Johnstown,Pa.(25) B2	4.325
Lackaw'na,N.Y.(24) B2	4.325
LosAngeles(25) B3	5.075
Milton,Pa. M18	4.325
Minnequa,Colo. C10	5.425
Pittsburg,Calif. C11	5.075
Riverdale,Ill. A1	4.55
SanFrancisco B7	5.05
Seattle(25) B3	5.325
Seattle N14	5.40
Sharon,Pa. S3	4.325
S.Chicago,Ill. W14	4.325
S.SanFrancisco(25) B3	5.075
SparrowsPoint,Md. B2	4.325
Sterling(1) N15	4.325
Sterling,Ill. N15	4.425
Torrance,Calif. C11	5.075
Warren,O. R2	4.325
Weirton,W.Va. W6	4.325
Youngstown U5	4.325

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19	7.50
Carnegie,Pa. S18	7.20
Fontana,Calif. K1	8.95
Gary,Ind. U5	7.20
Ind.Harbor,Ind. Y1	7.20
LosAngeles B3	8.40
Newport,Ky. N9	7.20
Sharon,Pa. S3	7.20
S.Chicago W14	7.20
Youngstown U5, Y1	7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2	6.425
Conshohocken,Pa. A3	6.425
Ecorse,Mich. G5	6.525
Fairfield,Ala. T2	6.425
Fontana,Calif. K1	7.575
Gary,Ind. U5	6.425
Houston S5	6.675
Ind.Harbor,Ind. I-2,Y1	6.425
KansasCity,Mo. S5	6.675
Lackawanna,N.Y. B2	6.425
LosAngeles(25) B3	7.175
Seattle(25) B3	7.425
Sharon,Pa. S3	6.425
S.SanFrancisco(25) B3	7.175
SparrowsPoint,Md. B2	6.425
Warren,O. R2	6.425
Weirton,W.Va. W6	6.425
Youngstown U5, Y1	6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	6.25
Baltimore T6	6.25
Boston T6	6.80
Buffalo S40	6.25
Cleveland A7, J5	6.25
Conshohocken,Pa. A3	6.30
Dearborn,Mich. D3	6.35
Detroit D2, M1, P20	6.35
Dover,O. G6	6.25
Ecorse,Mich. G5	6.35
Follansbee,W.Va. F4	6.25
Fontana,Calif. K1	8.00
FranklinPark,Ill. T6	6.35
Ind.Harbor,Ind. I-2	6.35
Ind.Harbor,Ind. Y1	6.25
Indianapolis C8	6.40
Lackawanna,N.Y. B2	6.25
LosAngeles C1	8.30
NewBedford,Mass. R10	6.70
NewBritain(10) S15	6.25
NewCastle,Pa. B4, E5	6.25
NewHaven,Conn. A7, D2	6.70
NewKensington,Pa. A6	6.25
Pawtucket,R.I. R3	6.90
Pawtucket,R.I. N8	6.80
Pittsburgh J5	6.25
Riverdale,Ill. A1	6.35
Rome,N.Y.(32) R6	6.25
Sharon,Pa. S3	6.25
SparrowsPt.,Md. B2	6.25
Trenton,N.J.(31) R5	7.80
Wallingford,Conn. W2	6.70
Warren,O. R2, T5	6.25
Weirton,W.Va. W6	6.25
Worcester,Mass. A7	6.60
Youngstown C8, Y1	6.25

STRIP, Cold-Rolled Alloy

Boston T6	13.80
Carnegie,Pa. S18	13.45
Cleveland A7	13.45
Dover,O. G6	13.45
FranklinPark,Ill. T6	13.45
Harrison,N.J. C18	13.45
Indianapolis C8	13.60
Pawtucket,R.I. N8	13.80
Sharon,Pa. S3	13.45
Worcester,Mass. A7	13.75
Youngstown C8	13.45

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	9.10
Dearborn,Mich. D2	9.20
Dover,O. G6	9.30
Ecorse,Mich. G5	9.20
Ind.Harbor,Ind. Y1	9.30

STRIP, Cold-Finished Spring Steel (Annealed)	0.25-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.40	9.35	10.90	13.05	15.75
Boston T6	7.65	9.35	10.90	13.05	15.75
Bristol,Conn. W1	...	...	10.90	13.05	15.75
Carnegie,Pa. S18	...	9.05	10.60	12.75	...
Cleveland A7	7.10	9.05	10.60	12.75	15.45
Cleveland C7	...	9.05	10.60	12.75	15.45
Dearborn,Mich. D3	7.20	9.15	10.70	...	...
Detroit D2	7.20	9.15	10.70	12.85	...
Dover,O. G6	7.10	9.05	10.60	12.75	15.45
FranklinPark,Ill. T6	7.20	9.05	10.60	12.75	15.45
Harrison,N.J. C18	...	...	10.90	13.05	15.75
Indianapolis C8	7.25	9.20	10.60	12.75	15.45
NewBritain,Conn.(10) S15	7.10	9.05	10.60	12.75	15.45
NewCastle,Pa. B4, E5	7.10	9.05	10.60	12.75	...
NewHaven,Conn. D2	7.55	9.35	10.90	13.05	...
NewKensington,Pa. A6	7.10	9.05	10.60	...	...
New York W3	...	9.35	10.90	13.05	15.75
Pawtucket,R.I. N8	7.65	9.35	10.90	13.05	15.75
Riverdale,Ill. A1	7.20	9.05	10.60	12.75	15.45
Rome,N.Y.(32) R6	7.10	9.05	10.60	12.75	15.45
Sharon,Pa. S3	7.10	9.05	10.60	12.75	15.45
Trenton,N.J. R5	...	9.35	10.90	13.05	15.75
Wallingford,Conn. W2	7.55	9.35	10.90	13.05	15.75
Warren,O. T5	7.10	9.05	10.60	12.75	15.45
Weirton,W.Va. W6	7.10	9.05	10.60	12.75	15.45
Worcester,Mass. A7, T6	7.65	9.35	10.90	13.05	15.75
Youngstown C8	7.10	9.05	10.60	12.75	15.45
Spring Steel (Tempered)					
Bristol,Conn. W1	...	...	14.80	18.15	...
Buffalo W12	...	...	14.80	...	...
FranklinPark,Ill. T6	...	...	15.15	18.50	22.35
Harrison,N.J. C18	...	...	14.80	18.15	22.00
NewYork W3	...	...	14.80	18.15	22.00
Trenton,N.J. R5	...	...	14.80	18.15	22.00
Worcester,Mass. W12	...	...	14.80	...	...
Worcester,Mass. A7, T6	...	...	14.80	18.15	22.00
Youngstown C8	...	...	15.15	18.50	22.35

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	6.55

TIGHT COOPERAGE HOOP

Atlanta A11	5.05
Riverdale,Ill. A1	4.90
Sharon,Pa. S3	4.75
Youngstown U5	4.75

STRIP, Electrogalvanized

Cleveland A7	6.25*
Dover,O. G6	6.25*
Riverdale,Ill. A1	6.35*
Warren,O. B9, T5	6.25*
Worcester,Mass. A7	6.50*
Youngstown C8	6.25*

*Plus galvanizing extras.

SILICON STEEL

H.R. SHEETS(22 Ga.,cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	...	9.95	10.95	11.85
Brackenridge,Pa. A4	...	...	9.95	10.95	11.85
Mansfield,O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. M21	8.40	9.35	9.95	10.95	...
Vandergrift,Pa. U5	...	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	...	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	...	...	10.70	11.70	12.60
GraniteCity,Ill. G4	8.50*	9.80*	10.40*	11.40	...
IndianaHarbor,Ind. I-2	8.60†	9.60*	10.20*	11.20*	...
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Vandergrift,Pa. U5	...	10.10†	10.70†	11.70†	12.60†
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	...	...	...
Newport,Ky. N9	12.80	...	...	...
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80§	13.35§	13.85§	14.85§

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-72	T-66	T-72
Brackenridge,Pa. A4	15.85	17.45	17.95	18.45	13.55**	
Butler,Pa. A10	...	...	17.45	17.95	...	...
Vandergrift,Pa. U5	14.85	15.85	17.45	17.95	...	13.55
Warren,O. R2	...	...	...	...	...	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	*$8.30*	*$8.55*	*$8.95*
Dravosburg,Pa. U5	*8.30*	*8.55*	*8.95*
Fairfield,Ala. T2	*8.40*	*8.65*	*9.05*
Fontana,Calif. K1	9.05	9.30	9.70
Fairless,Pa. U5	*8.40*	*8.65*	*9.05*
Gary,Ind. U5	*8.30*	*8.55*	*8.95*
GraniteCity,Ill. G4	*8.40*	*8.65*	*9.05*
IndianaHarbor,Ind. I-2, Y1	*8.30*	*8.55*	*8.95*
Niles,O. R2	*8.30*	*8.55*	*8.95*
Pittsburg,Calif. C11	*9.05*	*9.30*	*9.70*
SparrowsPoint,Md. B2	*8.40*	*8.65*	*9.05*
Weirton,W.Va. W6	*8.30*	*8.55*	*8.95*
Yorkville,O. W10	*8.30*	*8.55*	*8.95*

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	*6.975*		
Niles,O. R2	*6.975*	*7.175*	*7.375*

TINPLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa. J5	*$9.60*	*$9.85*
Dravosburg,Pa. U5	*9.60*	*9.85*
Fairfield,Ala. T2	*9.70*	*9.95*
Fairless,Pa. U5	*9.70*	*9.95*
Fontana,Calif. K1	10.35	10.60
Gary,Ind. U5	*9.60*	*9.85*
Ind.Har. I-2, Y1	*9.60*	*9.85*
Pitts.,Calif. C11	*10.35*	*10.60*
Sp.Pt.,Md. B2	*9.70*	*9.95*
Weirton,W.Va. W6	*9.60*	*9.85*
Yorkville,O. W10	*9.60*	*9.85*

BLACK PLATE (Base Box)	
Aliquippa,Pa. J5	*$7.40*
Dravosburg,Pa. U5	*7.40*
Fairfield,Ala. T2	*7.50*
Fairless,Pa. U5	*7.50*
Fontana,Calif. K1	8.15
Gary,Ind. U5	*7.40*
GraniteCity,Ill. G4	*7.50*
Ind.Harbor,Ind. I-2, Y1	*7.40*
Niles,O. R2	*7.40*
Pittsburg,Calif. C11	*8.15*
SparrowsPoint,Md. B2	*7.50*
Warren,O. R2	*7.40*
Weirton,W.Va. W6	*7.40*
Yorkville,O. W10	*7.40*

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5	*7.05*
Gary,Ind. U5	*7.05*
GraniteCity,Ill. G4	*7.15*
Ind.Harbor,Ind. Y1	*7.05*
Yorkville,O. W10	*7.05*

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5	*$9.10*
Gary,Ind. U5	*9.10*
Yorkville,O. W10	*9.10*

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10	*$9.55*

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5	*$10.65*

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	6.60
Aliquippa,Pa. J5	6.60
Alton,Ill.L1	6.775
Atlanta A11	6.80
Bartonville,Ill. K4	6.70
Buffalo W12	6.60
Chicago W13	6.60
Cleveland A7	6.60
Crawfordsville,Ind. M8	6.70
Donora,Pa. A7	6.60
Duluth,Minn. A7	6.60
Fairfield,Ala. T2	6.60
Fostoria,O. (24) S1	6.80
Houston S5	6.85
Jacksonville,Fla. M8	6.95
Johnstown,Pa. B2	6.60
Joliet,Ill. A7	6.60
KansasCity,Mo. S5	6.85
Kokomo,Ind. C16	6.70
LosAngeles B3	7.55
Minnequa,Colo. C10	6.85
Monessen,Pa. P7	6.60
Newark 6-8 ga. I-1	6.90
N.Tonawanda B11	6.60
Palmer,Mass. W12	6.90
Pittsburg,Calif. C11	*7.55*
Portsmouth,O. P12	6.90
Rankin,Pa. A7	6.60
S.Chicago,Ill. R2	6.60
S.SanFrancisco C10	7.55
SparrowsPoint,Md. B2	6.70
Sterling,Ill.(1) N15	6.60
Sterling,Ill. N15	6.70
Struthers,O. Y1	6.60
Waukegan,Ill. A7	6.60
Worcester,Mass. A7	6.90

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	7.90
Alton,Ill. L1	8.075
Bartonville,Ill. K4	8.00
Buffalo W12	7.90
Cleveland A7	7.90
Donora,Pa. A7	7.90
Duluth,Minn. A7	7.90
Fostoria,O. S1	7.95
Johnstown,Pa. B2	7.90
LosAngeles B3	8.85
Milbury,Mass.(12) N6	8.20
Minnequa,Colo. C10	8.15
Monessen,Pa. P16	7.90
Muncie,Ind. I-7	8.10
Palmer,Mass. W12	8.20
Pittsburg,Calif. C11	8.85
Portsmouth,O. P12	7.90
Roebling,N.J. R5	8.20
S.Chicago,Ill. R2	7.90
S.SanFrancisco C10	8.85
SparrowsPt.,Md. B2	8.00
Struthers,O. Y1	7.90
Trenton,N.J. A7	8.20
Waukegan,Ill. A7	7.90
Worcester A7,J4,T6,W12	8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5	7.60
Alton,Ill. L1	7.775
Buffalo W12	7.60
Cleveland A7	7.60
Donora,Pa. A7	7.60
Duluth,Minn. A7	7.60
Johnstown,Pa. B2	7.60
KansasCity,Mo. S5	7.85
LosAngeles B3	8.55
Minnequa,Colo. C10	7.775
Monessen,Pa. P16	7.60
NewHaven,Conn. A7	7.90
PalmerMass. W12	7.90
Pittsburg,Calif. C11	8.55
Portsmouth,O. P12	7.60
Roebling,N.J. R5	7.90
S.Chicago,Ill. R2	7.60
S.SanFrancisco C10	8.55
SparrowsPoint,Md. B2	7.70
Struthers,O. Y1	7.60
Trenton,N.J. A7	7.90
Waukegan,Ill. A7	7.60
Worcester,Mass. A7	7.90

WIRE, Fine & Weaving(8"Coils)

Alton,Ill. L1	12.725
Bartonville,Ill. K4	12.65
Buffalo W12	12.55
Chicago W13	12.55
Cleveland A7	12.55
Crawfordsville,Ind. M8	12.65
Fostoria,O. S1	12.55
Jacksonville,Fla. M8	12.90
Johnstown,Pa. B2	12.55
Kokomo,Ind. C16	12.55
Minnequa,Colo. C10	12.30
Monessen,Pa. P6	12.55
Muncie,Ind. I-7	12.75
Palmer,Mass. W12	12.85
Roebling,N.J. R5	12.85
S.SanFrancisco C10	12.90
Waukegan,Ill. A7	12.55
Worcester,Mass. A7,T6	12.85

WIRE, Gal'd AC5R for Cores

Bartonville,Ill. K4	10.70
Buffalo W12	10.70
Johnstown,Pa. B2	10.70
Minnequa,Colo. C10	10.825
Monessen,Pa. P16	10.70
Muncie,Ind. I-7	10.90
Palmer,Mass. W12	11.00
Pittsburg,Calif. C11	11.50
Portsmouth,O. P12	10.70
Roebling,N.J. R5	11.00
SparrowsPt.,Md. B2	10.80
Struthers,O. Y1	10.70

ROPE WIRE (A)

Bartonville,Ill. K4	10.55
Buffalo W12	10.55
Fostoria,O. S1	10.55
Johnstown,Pa. B2	10.55
Monessen,Pa. P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.55
Portsmouth,O. P12	10.55
Roebling,N.J. R5	10.85
SparrowsPt. B2	10.65
Struthers,O. Y1	10.55
Worcester,Mass. J4	10.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE
(Continued)

WIRE, Tire Bead
Bartonville,Ill. K4 ....14.15
Monessen,Pa. P16 ....14.20
Roebling,N.J. R5 ....14.35

WIRE, Cold-Rolled Flat
Anderson,Ind. G6 ....9.50
Baltimore T6 ....9.80
Boston T6 ....9.80
Buffalo W12 ....9.50
Cleveland A7 ....9.50
Crawfordsville,Ind. M8..9.00
Dover,O. G6 ....9.50
Fostoria,O. S1 ....9.50
FranklinPark,Ill. T6 ..9.50
Kokomo,Ind. C16 ....9.50
Massillon,O. R8 ....9.50
Milwaukee C23 ....9.70
Monessen,Pa. P16 ....9.50
Pawtucket,R.I. N8 ....9.80
Riverdale,Ill. A1 ....9.60
Rome,N.Y. R6 .... 9.50
Trenton,N.J. R5 ....9.80
Worcester A7, T6, W12 9.80

NAIL, Stock
To Dealers & Mfrs. (7) Col.
AlabamaCity,Ala. R2 ...152
Aliquippa,Pa. J5 152
Atlanta A11 154
Bartonville,Ill. K4 154
Chicago,Ill. W13 152
Cleveland A9 157
Crawfordsville,Ind. M8 ..154
Donora,Pa. A7 152
Duluth,Minn. A7 152
Fairfield,Ala. T2 152
Galveston,Tex. D7 157
Houston,Tex. S5 157
Jack'ville,Fla.(23) M8...162
Johnstown,Pa. B2 152
Joliet,Ill. A7 152
KansasCity,Mo. S5 157
Kokomo,Ind. C16 154
Minnequa,Colo. C10 157
Monessen,Pa. P7 152
Pittsburg,Calif. C11 171
Rankin,Pa. A7 152
S.Chicago,Ill. R2 152
SparrowsPt.,Md. B2 154
Sterling,Ill.(1) N15 152
Worcester,Mass. A7 158

NAILS, CUT (100 lb keg)
To Dealers (33)
Conshohocken,Pa. A3 ..$9.05
Wheeling,W.Va. W10 ...9.05

STAPLES, Polished Stock
To Dealers & Mfrs. (7) Col.
AlabamaCity,Ala. R2 ...152
Aliquippa,Pa. J5 152
Atlanta A11 154
Bartonville,Ill. K4 154
Crawfordsville,Ind. M8 ..154
Donora,Pa. A7 152
Duluth,Minn. A7 152
Fairfield,Ala. T2 152
Jack'ville,Fla.(23) M8...162
Johnstown,Pa. B2 152
Joliet,Ill. A7 152
Kokomo,Ind. C16 154
Minnequa,Colo. C10 157
Monessen,Pa. P7 152
Pittsburg,Calif. C11 171
Rankin,Pa. A7 152
S.Chicago,Ill. R2 152
SparrowsPt.,Md. B2 154
Sterling,Ill. (1) N15 152
Worcester,Mass. A7 158

TIE WIRE, Automatic Baler (14½ Ga.) (Per 97 lb Net Box)
Coil No. 3150
AlabamaCity,Ala. R2 ..$9.45
Bartonville,Ill. K4 ....9.45
Buffalo W12 ....9.45
Crawfordsville,Ind. M8..9.45
Donora,Pa. A7 ....9.45
Duluth,Minn. A7 ....9.45
Jacksonville,Fla. M8...9.88
Johnstown,Pa. B2 ....9.45
Joliet,Ill. A7 ....9.45
Kokomo,Ind. C16 ....9.45
LosAngeles B3 ....10.24
Minnequa,Colo. C10 ....9.60
Pittsburg,Calif. C11 ....10.23
S.Chicago,Ill. R2 ....9.45
SparrowsPt.,Md. B2 ....9.55
Sterling,Ill. N15 ....9.35

Coil No. 6500 Stand.
AlabamaCity,Ala. R2 ..$9.75
Bartonville,Ill. K4 ....9.75
Buffalo W12 ....9.75
Crawfordsville,Ind. M8..9.75
Donora,Pa. A7 ....9.75
Duluth,Minn. A7 ....9.75
Jacksonville,Fla. M8 ..10.18
Johnstown,Pa. B3 ....9.75
Joliet,Ill. A7 ....9.75
Kokomo,Ind. C16 ....9.75
LosAngeles B3 ....10.65
Minnequa,Colo. C10 ....9.90
Pittsburg,Calif. C11 ...10.55
S.Chicago,Ill. R2 ....9.75
SparrowsPt.,Md. B2 ...9.85
Sterling,Ill. N15 ....9.65

Coil No. 6500 Interim
AlabamaCity,Ala. R2 ..$9.80
Bartonville,Ill. K4 ....9.80
Buffalo W12 ....9.80
Crawfordsville,Ind. M8..9.80
Donora,Pa. A7 ....9.80
Duluth,Minn. A7 ....9.80
Jacksonville,Fla. M8 ..10.23
Johnstown,Pa. B2 ....9.80
Joliet,Ill. A7 ....9.80
Kokomo,Ind. C16 ....9.80
LosAngeles B3 ....10.60
Minnequa,Colo. C10 ....9.95
Pittsburg,Calif. C11 ...10.60
S.Chicago,Ill. R2 ....9.80
SparrowsPt.,Md. B2 ...9.90
Sterling,Ill. N15 ....9.70

WIRE, Barbed Col.
AlabamaCity,Ala. R2..175••
Aliquippa,Pa. J5 ....172‡
Atlanta A11 181
Bartonville,Ill. K4 181
Crawfordsville,Ind. M8 ..181
Donora,Pa. A7 ....175†
Duluth,Minn. A7 ....175†
Fairfield,Ala. T2 ....175†
Houston,Tex. S5 ....180••
Jacksonville,Fla. M8 186
Johnstown,Pa. B2 ....179•
Joliet,Ill. A7 ....175†
KansasCity,Mo. S5 ....180••
Kokomo,Ind. C16 ....177†
Minnequa,Colo. C10 ...180••
Monessen,Pa. P7 ....178††
Pittsburg,Calif. C11 ....195†
Rankin,Pa. A7 ....175†
S.Chicago,Ill. R2 ....175••
S.SanFrancisco C10 ...195••
SparrowsPoint,Md. B2 ..181•
Sterling,Ill.(1) N15 ...179††

WOVEN FENCE, 9-15 ga. Col.
Ala.City,Ala. R2 ....162••
Ala.City, 17 ga. R2 ...257••
Aliq'ppa,Pa.9-14½ga J5 165‡
Atlanta A11 168
Bartonville,Ill. K4 168
Crawfordsville,Ind. M8 ..168
Donora,Pa. A7 ....162†
Duluth,Minn. A7 ....162†
Fairfield,Ala. T2 ....162†
Houston,Tex. S5 ....167••
Jacksonville,Fla. M8 173
Johnstown,Pa.(43) B2 ...166
Joliet,Ill. A7 ....162†
KansasCity,Mo. S5 ....167••
Kokomo,Ind. C16 ....164†
Minnequa,Colo. C10 ...167••
Monessen,Pa. 9 ga. P17 166††
Pittsburg,Calif. C11 ....185†
Rankin,Pa. A7 ....162†
S.Chicago,Ill. R2 ....162••
Sterling,Ill.(1) N15 ....166††

WIRE (16 Gage)	An'ld Galv. Stone	Stone
Ala.City R2	14.50	16.05••
Bartonville K4	14.50	16.55
Buffalo W12	14.50	....
Cleveland A7	14.50	....
Crawf'dsville M8	14.60	16.55
Fostoria,O. S1	14.60	16.15†
Jacksonville M8	14.85	16.80
Johnstown B2	14.50	16.40•
Kokomo C16	14.60	16.15†
Minnequa C10	14.75	16.45••
Palmer,MassW12	14.50	16.05•
Pitts.,Calif. C11	14.85	16.40†
S.Chicago R2	14.50	16.05••
SparrowsPt. B2	14.60	16.50•
Sterling(1) N15	14.50	16.45††
Waukegan A7	14.50	16.05
Worcester A7	14.50	....

WIRE, Merchant Quality
(6 to 8 gage) An'ld Galv.
Ala.City,Ala. R2..7.50 7.90••
Aliquippa J5 ....7.40 7.925‡
Atlanta A11 ....7.60 8.20
Bartonville(48) K4 7.60 8.20
Buffalo W12 ....7.50 7.90†
Cleveland A7 ....7.50 ....
Crawfordsville M8 7.50 8.10
Donora,Pa. A7 ...7.50 7.90†
Duluth,Minn. A7 ..7.50 7.90†
Fairfield T2 ....7.50 7.90†
Houston(48) S5 ..7.65 8.05••
Jacks'ville,Fla.M8 7.75 8.35
Johnstown B2(48) 7.50 8.10•
Joliet,Ill. A7 ....7.50 7.90†
Kans.City(48) s5 7.65 8.05••
Kokomo C16 ....7.50 7.90†
LosAngeles B3 ...8.45 9.05•
Minnequa C10 ...7.65 8.05••
Monessen P7(48) 7.40 8.00††
Palmer,Mass. W12 7.80 8.20†
Pitts.,Calif. C11 ..8.45 8.85†
Portsmouth,O. P12 7.50 ....
Rankin A7 ....7.50 7.90†
S.Chicago R2 ....7.50 7.90••
S.SanFran. C10 ..8.35 8.75••
Spar'wsPt. B2(48) 7.60 8.20•
Str'ling(1)(48)N15 7.40 8.00††
Struthers,O.(48) Y1 7.50 8.00‡
Worcester,Mass.A7 7.80 8.20†

Based on zinc price of: *13.50c. †5c. §10c. ‡Less than 10c. ††13c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts
Full-Size Body (cut thread)
†½" x 6" and smaller 61
Larger than ½" diam. and all diams. longer than 6" 55
Under-Size Body (rolled thread; not nutted):
½" x 6" and smaller. 61

†½" x 4" and smaller and shorter are not nutted.

NUTS
Reg. & Heavy Square Nuts:
All sizes 61
H. P. Reg. & Heavy Hex
Nuts:
⅝" & smaller 64
⅝" to 1⅛" incl. 63
1⅛" to 1½" incl. 65
1⅝" & larger 61
C.P. Reg. & Heavy Hex Nuts
⅝" & smaller 64
⅝" & larger 61
Semifinished & Finished Nuts
⅝" & smaller 66
⅝" & larger 63
Semifinished Slotted Reg. & Heavy Hex Nuts
⅝" & smaller 66
⅝" & larger 63
Hot Galvanized Nuts, all types
1½" & smaller 44
(On above items, add 25% for less than case quantities)

CAP SCREWS
(New Std., hexagon head, upset, packages)
Bright:
6" and shorter:
¼" through ½" diam. 34
⅝" & ⅝" diam. 31
¾", ⅞", 1" 8
Longer than 6":
¼" through ⅝" diam. 3
⅝" through 1" diam. +13
High Carbon, Heat-treated:
6" and shorter:
¼" through ½" diam. 20
⅝" & ⅝" diam. 16
¾", ⅞", 1" ..... +11
Longer than 6":
¼" through ⅝" diam. +23
⅝" through 1" diam. +41
(New Std. Hexagon head, upset, bulk)
Bright:
½" x 6" & smaller & shorter 49
⅝", ½", ⅝" diam. x 6" & shorter 48
¾", ⅞", 1" x 6" & shorter 31
High Carbon, Heat-treated:
½" x 6" & smaller & shorter 41
⅝" x ⅝" diam. & 6" & shorter 39
¾", ⅞", 1" x 6" & shorter 20

MACHINE SCREW NUTS & STOVE BOLT NUTS (Bulk)
No. 2 to ⅝" incl., Square:
25,000 to 199,999 pieces 20
200,000 or more pieces 27
No. 2 to ⅝" incl., Hex.:
25,000 to 199,999 pieces 18
200,000 or more pieces 25

MACHINE SCREWS, SLOTTED (Bulk)
No. 2 to ½" diam. incl.:
25,000 to 199,999 pieces 20
200,000 or more pieces 27
⅝" to ½" diam. incl.:
15,000 to 99,999 pieces 20
100,000 or more 27

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.06	20.42
1¼	13	....	24.94	20.45
1½	13	23.31	27.57	22.61
1⅝	13	27.84	32.57	26.71
2	13	30.87	36.51	29.93
2¼	12	34.77	41.12	33.72
2½	12	37.73	44.63	36.60
2¾	12	41.57	49.16	40.31
2⅞	12	45.00	53.22	43.65
3	12	47.99	56.76	46.55

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Standard All	Toe Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	4.625	4.675	....
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	....
Johnstown,Pa. B2	....	....	....(16)	5.65
Lackawanna,N.Y. B2	4.725	4.625	....(16)	5.65
Minnequa,Colo. C10	4.725	4.625	....	6.15
Steelton,Pa. B2	4.725	4.625	....	....
Williamsport,Pa. S19	....	....	....	5.65

TIE PLATES

Fairfield,Ala. T2	5.625	Bessemer,Pa. U5 5.825
Gary,Ind. U5	5.625	Fairfield,Ala. T2 5.825
Ind.Harbor,Ind. I-2	5.625	Ind.Harbor,Ind. I-2 5.825
Lackawanna,N.Y. B2	5.625	Joliet,Ill. U5 5.825
Minnequa,Colo. C10	5.625	Lackawanna,N.Y. B2 5.825
Seattle B3	5.775	Minnequa,Colo. C10 5.825
Steelton,Pa. B2	5.625	Steelton,Pa. B2 5.825
Torrance,Calif. C11	5.775	

TRACK BOLTS, Untreated
Cleveland R2 ....12.15
KansasCity,Mo. S5 ...12.90•
Lebanon,Pa. B2 ....12.15
Minnequa,Colo. C10 ...12.15
Pittsburgh O3, P14 ...12.15
Seattle B3 ....12.65

*Treated

AXLES
Ind.Harbor,Ind. S12 ...7.50
Johnstown,Pa. B2 ....7.50

SCREW SPIKES
Cleveland R2 ....11.90
Pittsburgh O3 ....11.90

STANDARD TRACK SPIKES
Fairfield,Ala. T2 ....8.05
Ind.Harbor,Ind. Y1 ....8.05
Ind.Harbor,Ind. I-2 ....7.90
KansasCity,Mo. S5 ....7.90
Lebanon,Pa. B2 ....8.05
Minnequa,Colo. C10 ....7.90
Pittsburgh J5 ....8.05
Seattle B3 ....8.55
S.Chicago,Ill. R2 ....8.05
Struthers,O. Y1 ....8.05
Youngstown R2 ....8.05

METAL POWDER

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge iron:	
98+% Fe, annealed	9.25
Swedish, c.i.f., Camden, N. J., c.l. in bags	9.50
Domestic:	
F.o.b., Johnstown, Pa., Niagara Falls, N.Y., in bags	9.50
F.o.b. Riverton, N. J., in bags	8.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	22.00
Annealed, 99.5% Fe	36.50
Unannealed (99+% Fe)	34.00
Unannealed (99+% Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl Iron:	
98.1-99.9%, 3 to 20 microns, depending on grade, $6.00-275.00, in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500 lb, drum frght. allowed	
Carlots	34.50
Ton lots	36.50
Antimony, 500 lb lots	32.00•
Brass, 5000-lb lots	41.75-65.25†
Bronze, 5000-lb lots	67.50-71.75†
Copper:	
Electrolytic	14.25•
Reduced	14.25•
Lead	7.50•
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.00
Nickel-Silver, 5000-lb lots	62.75-65.25†
Phosphor-Copper, 5000-lb lots	68.75
Silicon	47.50
Solder	7.00•
Stainless Steel, 302	99.00
Stainless Steel, 316	$1.32
Tin	14.50•
Zinc 5000-lb lots	19.25-33.00†
Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over	4.50
Less than 1000 lb.	4.65
Chromium, electrolytic 99.8% Cr min. metallic basis	5.00

•Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. ••64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1½-in. to less than 1 7/16-in.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.25c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.142 to 0.249 in.; for gage 0.142 and lighter, 5.85c.
(15) ⅛" and thinner.
(16) 49 lb and under.
(17) Flats only; 6.35 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Plus 4c per 100 lb.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝-in.; 6.90c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) $ 0.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 16 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.25c.
(43) 9-14½ Ga.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds; 7.95c over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Ambridge, Pa. N2	6.5	....	10.5	....	13	....	14.5	....	14.5	....	14	....	16.5	....
Lorain, O. N3	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Youngstown Y1	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown K2	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Alton, Ill. L1	....	....	....	....	....	....	18.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Benwood, W. Va. W10	17.5	+13	9	+18.5	+0.75	+28.5	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Butler, Pa. F6	18	+12.5	9.5	+18	1.5	+26	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Fairless, Pa. N3	....	....	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Fontana, Calif. K1	....	....	....	....	....	....	6	+13.25	9	+9.25	11.5	+5.75	14	+4
Ind. Harbor, Ind. Y1	....	....	....	....	....	....	17.5	+1.75	20.5	2.25	23	5.75	25.5	7.5
Lorain, O. N3	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sharon, Pa. S4	18	+12.5	9.5	+18	1.5	+26	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sparrows Pt., Md. B2	16	+12.5	7.5	+18	+0.5	+25	16.5	+0.75	19.5	3.25	22	6.75	24.5	8
Youngstown R2, Y1	....	....	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Wheatland, Pa. W9	18	+12.5	9.5	+18	1.5	+26	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	27	9.5	27.5	10	29	10.75	29	10.75	....	....	....	....
Alton, Ill. L1	25	7.5	25.5	8	27	8.75	27	8.75	....	....	....	....
Benwood, W. Va. W10	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Etna, Pa. N2	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Fairless, Pa. N3	25	7.5	25.5	8	27	8.75	27	8.75	17.5	+1.25	17.5	+1.25
Fontana, Calif. K1	14.5	+3	15	+2.5	16.5	+1.75	16.5	+1.75	7	+11.75	7	+11.75
Ind. Harbor, Ind. Y1	26	8.5	26.5	9	28	9.75	28	9.75	18.5	+0.25	18.5	+0.25
Lorain, O. N3	27	9.5	27.5	10	29	10.75	29	10.75	....	....	....	....
Sharon, Pa. M6	27	9.5	27.5	10	29	10.75	29	10.75	....	....	....	....
Sparrows Pt., Md. B2	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Wheatland, Pa. W9	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Youngstown R2, Y1	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	Seamless Tube Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	18.50	23.00	....	....	31.00	....	....	....	42.25	39.00
202	19.75	25.50	31.00	36.25	33.50	....	36.75	38.75	42.50	42.50
301	19.25	23.75	....	36.75	32.00	36.00	38.00	....	44.25	41.00
302	20.50	26.25	32.00	37.25	34.50	36.25	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	36.25	38.25	40.25	47.00	47.00
303	....	26.75	34.75	40.00	....	39.00	41.00	....	....	....
304	21.75	27.50	33.75	39.00	37.25	38.25	40.25	43.00	47.25	47.25
304L	....	....	38.75	44.00	42.25	43.25	45.25	48.00	52.25	52.25
305	23.25	30.25	....	39.50	40.25	38.25	40.25	43.50	50.25	50.25
308	23.50	30.50	38.50	44.25	41.25	43.25	45.50	49.75	52.00	52.00
309	31.00	39.75	46.75	53.50	53.50	52.00	54.75	58.25	67.00	67.00
310	37.25	48.00	62.25	72.25	68.50	69.75	73.50	75.25	78.75	78.75
314	....	....	....	....	....	69.75	....	75.25	....	....
316	31.50	40.25	51.25	59.50	58.25	57.75	60.75	64.00	68.25	68.25
316L	....	....	56.25	64.50	63.25	62.75	65.75	69.00	73.25	73.25
317	37.25	48.25	62.75	72.75	75.50	70.75	74.50	77.00	83.75	83.75
321	25.00	32.00	38.25	44.00	44.25	43.00	45.25	49.25	54.25	54.25
18-8CbTa	29.25	38.00	45.75	52.25	53.25	50.75	53.50	58.00	66.50	66.50
403	....	....	28.75	32.75	....	32.25	34.00	36.25	....	....
405	17.50	23.00	26.75	31.00	32.25	30.50	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	29.00	30.50	31.75	36.25	36.25
416	....	....	26.00	30.00	....	29.50	31.00	....	....	....
420	....	30.25	31.00	36.00	37.75	35.50	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	29.50	31.00	32.25	34.50	36.75
430F	....	....	26.50	30.50	....	30.00	31.50	....	....	....
431	....	25.50	33.25	....	....	37.25	39.25	40.75	....	....
446	....	....	35.50	40.50	53.25	40.00	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp., Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates—Carbon Base 10%	Plates—Carbon Base 20%	Sheets Carbon Base 20%
302	....	....	30.50
304	30.30	36.05	32.50
304-L	32.30	37.95	....
310	41.30	47.00	....
316	35.50	41.40	47.00
316-L	40.00	46.10	....
316-CB	41.15	48.45	....
321	32.00	37.75	37.25
347	34.40	41.40	48.25
405	25.80	33.35	....
410	25.30	32.85	....
430	25.30	32.85	....
Inconel	49.45	65.45	....
Nickel	41.05	55.65	....
Nickel, Low Carbon	43.25	60.05	....
Monel	42.35	56.35	....
Copper*	....	....	46.00

	Strip, Carbon Base—Cold Rolled 10%	Strip, Carbon Base—Cold Rolled Both Sides
*Copper**	*33.75*	*42.75*

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.275	5% Cr Hot Work	0.430-0.460
Extra Carbon	0.330	W-Cr Hot Work	0.450
Special Carbon	0.390	V-Cr Hot Work	0.470
Oil Hardening	0.430	Hi-Carbon-Cr	0.770

Grade by Analysis (%) W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.090
18.25	4.25	1	4.75	...	2.305-2.475
18	4	2	9	...	2.675-2.6775
18	4	2	....	...	1.765
18	4	1	....	...	1.600
13.75	3.75	2	5	...	2.245
13.5	4	3	....	...	1.865
9	3.5	..	....	...	1.180
6	4	2	....	5	1.105
6	4	3	....	6	1.350
1.5	4	1	....	8.5	0.960

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
AlabamaCity,Ala. R2	54.50	....	....	....
B'rmingham R2	54.50	55.00‡	....	....
B'rmingham U6	....	55.00‡	59.00	....
Woodward,Ala. W15	54.50	55.00‡	59.00	....
Cincinnati, deld.	....	62.70	....	....
Buffalo District				
Buffalo H1, R2	60.00	60.50	61.00	61.50
Tonawanda,N.Y. W12	60.00	60.50	61.00	61.50
N.Tonawanda,N.Y. T9	....	60.50	61.00	61.50
Boston, deld.	70.65	71.15	71.65	....
Rochester,N.Y. deld.	63.02	63.52	64.02	....
Syracuse,N.Y. deld.	64.12	64.62	65.12	....
Chicago District				
Chicago I-3	60.00	60.50	60.50	61.00
Gary,Ind. U5	60.00	....	60.50	....
S.Chicago R2	60.00	....	60.50	....
S.Chicago,Ill. Y1	60.00	60.50	60.50	61.00
S.Chicago,Ill. U5, W14	60.00	....	60.50	61.00
Milwaukee, deld.	62.30	62.80	62.80	63.30
Muskegon,Mich. deld.	....	67.18	67.18	....
Cleveland District				
Cleveland R2, A7	60.00	60.50	60.50	61.00
Akron,O. deld.	62.75	63.25	63.25	63.75
Mid-Atlantic District				
Bethlehem,Pa. B2	62.00	62.50	63.00	63.50
NewYork, deld.	....	66.51	67.01	....
Newark, deld.	65.20	65.70	66.20	66.70
B'rdsboro,Pa. B10	62.00	62.50	63.00	63.50
Chester,Pa. P14	62.00	62.50	63.00	....
Philadelphia, deld.	63.76	64.26	64.76	....
Steelton,Pa. B2	62.00	62.50	63.00	63.50
Swedeland Pa. A3	62.00	62.50	63.00	63.50
Philadelphia, deld.	63.76	64.26	64.76	65.26
Troy,NY. R2	62.00	62.50	63.00	63.50
Pittsburgh District				
NevilleIsland,Pa. P6	60.00	60.50	60.50	....
Pittsburgh (N&S sides), Aliquippa, deld.	....	61.95	61.95	62.45
McKeesRock, deld.	....	61.60	61.60	62.13
Lawrenceville, Homestead, Wilmerding,Monaca, deld.	....	62.26	62.26	62.79
Verona,Trafford, deld.	62.29	62.82	62.82	63.35
Brackenridge, deld.	62.60	63.10	63.10	63.63
Bessemer Pa. U5	60.00	....	60.50	61.00
Clairton,Rankin,S.Duquesne,Pa. U5	60.00	....	....	....
Midland,Pa. C18	60.00	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard,O. Y1	....	....	60.50	....
Sharpsville,Pa. S6	60.00	....	60.50	61.00
Youngstown Y1	....	....	60.50	61.00
Youngstown U5	60.00	....	....	61.00
Mansfield,O. deld.	64.90	....	65.40	65.90
Duluth I-3	60.00	60.50	60.50	61.00
Erie,Pa. I-3	60.00	60.50	60.50	61.00
Everett,Mass. E1	62.00	62.50	63.00	....
Fontana,Calif. K1	67.50	68.00	....	....
Geneva,Utah C11	60.00	60.50	....	....
GraniteCity,Ill. G4	61.90	62.40	62.90	....
Ironton,Utah C11	60.00	60.50	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	62.00	62.50	63.00	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo,O. I-3	60.00	60.50	60.50	61.00
Cincinnati, deld.	65.76	66.26	....	....

*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.
‡Intermediate (Phos. 0.31-0.69%), $56.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	69.00
Buffalo H1	70.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls,N.Y. P15	$92.50
Keokuk,Iowa, Open-hearth & Fdry. (freight allowed K2)	97.00
Keokuk, O. H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	100.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$72.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	72.50
Steelton,Pa. B2 (Phos. 0.035% max)	68.00
Philadelphia, deld.	71.55
Troy,N.Y. R2 (Phos. 0.035% max)	68.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	65.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	65.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	65.00
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	65.00

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Merchant Qual.	H.R. Spec. Qual.	C.F. Rds.§	H.R. Alloy 4140††		Carbon	Floor
Atlanta	7.14	8.20	8.87	....	7.40	7.42	....	9.39	....	7.63	7.49	9.48
Baltimore	7.24	8.35	8.50	....	7.70	7.70	....	8.49[8]	14.39	7.94	7.56	9.02
Birmingham	7.13	8.24	8.85	....	7.21	7.27	7.80	9.35	....	7.43	7.45	9.50
Boston	8.12	9.07	10.32	53.32	8.21	8.21	8.76	9.73	13.56	8.27	8.41	9.84
Buffalo	7.20	8.25	10.01	....	7.35	7.35	8.05	7.90	13.35	7.60	7.65	9.00
Chattanooga	7.28	8.44	8.60	....	7.36	7.42	7.95	9.18	....	7.63	7.60	9.32
Chicago	7.13	8.24	9.10	46.75	7.21	7.27	7.80	7.75	13.05	7.43	7.45	8.72
Cincinnati	7.25	8.23	9.10	46.10	7.45	7.51	8.04	8.15	13.29	7.90	7.74	8.97
Cleveland	7.13	8.24	8.95	49.16	7.31	7.33	7.86	8.00	13.11	7.76	7.62	8.89
Denver	8.95	10.31	11.73	....	9.10	9.10	....	9.82	17.87	8.95	9.10	10.50
Detroit	7.32	8.43	9.38	43.50	7.49	7.55	8.08	8.04	13.25	7.90	7.73	8.91
Erie, Pa.	7.08	8.24	8.95[10]	....	7.31	7.35	....	8.10[10]	....	7.65	7.30	8.79
Houston	7.85	8.75	10.49	....	8.15	8.25	....	9.85	14.00	8.20	7.80	9.20
Jackson, Miss.	7.46	8.52	9.22	....	7.44	7.59	8.12	9.44	....	7.75	7.77	9.44
Los Angeles	8.15	10.00	11.00	51.50	8.50	8.15	8.70	10.90	14.35	8.30	8.75	10.55
Milwaukee	7.22	8.33	9.19	....	7.30	7.36	7.89	7.94	13.14	7.60	7.54	8.81
Moline, Ill.	7.15	8.44	8.85	....	7.41	7.43	....	8.00	....	7.63	7.34	....
New York	7.78	8.88	9.63	53.13	8.23	8.16	8.71	9.77	13.47	8.11	8.21	9.50
Norfolk, Va.	7.35	....	....	....	7.80	7.85	....	9.95	....	8.10	7.60	9.10
Philadelphia	7.34	8.44	9.41	45.98	7.99	7.73	8.26	8.52	13.25	7.75	7.72	8.83**
Pittsburgh	7.13	8.24	9.40	49.00	7.21	7.27	7.80	8.00	13.05	7.43	7.45	8.72
Portland, Oreg.	7.80	8.80	10.65	....	8.00	7.95	....	12.20	15.00	7.85	7.75	9.60
Richmond, Va.	7.25	....	9.49	....	7.85	7.85	....	9.50	....	8.10	7.50	9.35
St. Louis	7.42	8.53	9.69	43.89	7.50	7.56	8.09	8.29	13.34	7.83	7.74	9.01
St. Paul	7.46	8.59	9.16	....	7.72	7.74	....	8.51	13.51	7.94	7.65	9.12
San Francisco	8.20	9.65	10.15	51.65	8.35	8.15	8.70	11.45	14.35[8]	8.25	8.30	10.50
Seattle	7.85	10.50	10.90	54.00	8.90	8.60	9.15	12.25	14.65	8.50	8.50	10.70
Spokane	8.75	11.10[7]	10.90	....	8.90	8.60	9.15	12.25	15.40	8.50	8.50	11.20
Washington	7.78	9.80	8.60	....	8.49	8.24	....	9.40	....	8.51	8.11	9.56

*Prices do not include gage extras; †prices include gage and coating extras (based on 13.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **¼-in. and heavier; ††as annealed; §§under ½-in.

Base quantities 2000 to 4999 lb except as noted: Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 5000 lb except in Chicago, New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [5]—500 to 9999 lb; [6]—400 to 999 lb; [7]—4000 lb and over; [8]—1000 to 1999 lb; [9]—1000 lb and over; [7]—1500 to 3999 lb; [8]—2000 to 3999 lb; [9]—f.o.b. local delivery in lots of 10,000 lb and over; [10]—2000 lb and over.

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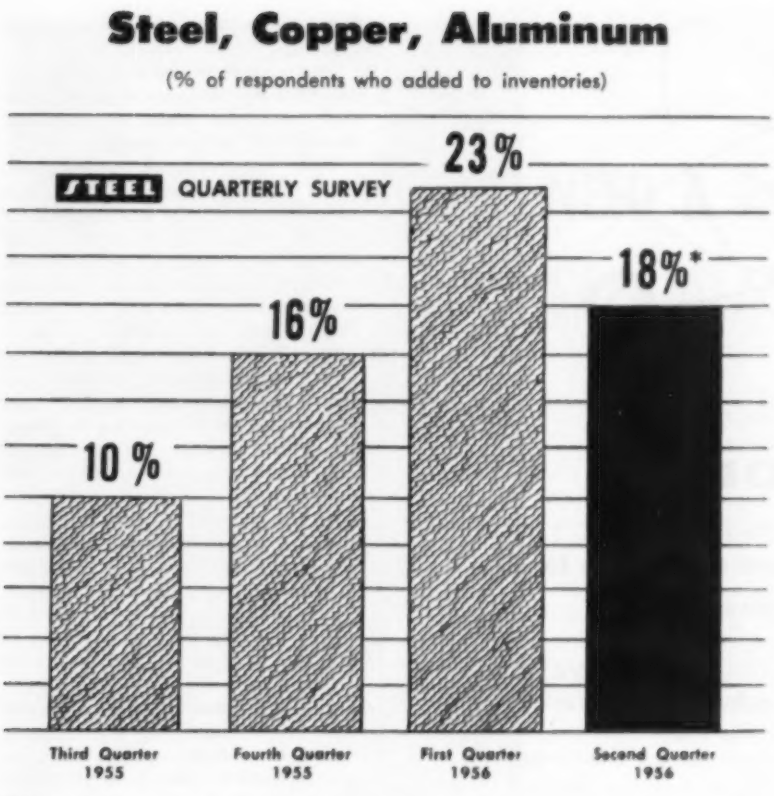

Steel, Copper, Aluminum
(% of respondents who added to inventories)
STEEL QUARTERLY SURVEY
10%
16%
23%
18%*
Third Quarter 1955
Fourth Quarter 1955
First Quarter 1956
Second Quarter 1956
*Estimated
Survey includes: Steel products (bars, strip, sheet, plate, structural shapes, wire, tubing), pig iron, copper and brass mill products, copper wire and cable and aluminum products

Metal Inventories Improve

METAL USERS stacked the stuff away in the first quarter (see chart). They outdid themselves, too, when you remember that production has been high throughout the metalworking industry with the exception of automotive and farm machinery firms.

Three months ago only 18 per cent of STEEL's regular survey respondents expected to build inventories during the quarter (Feb. 6, page 86); with 23 per cent now reporting higher stocks, that's the second quarter in a row in which more built than expected to.

Happy Days—What's ahead for the second quarter? Crosscurrents will be at work. While again 18 per cent believe inventories will be higher, 28 per cent hope to be better off. The difference between the two figures can be analyzed in terms of the 30 per cent of the respondents who expect to lower inventories. Production demands in the second quarter will cut into stocks already built.

The dominant shift has been into the 30-60 day position and out of the 10-30 day category: 39 per cent of the respondents have a 30-60 day supply of metals.

Grateful—Says a Buffalo buyer: "The inventory high is due to automotive cutbacks; however, we expect new schedules soon, which will bring inventory into a good balance." An Indiana purchasing agent agrees: "Most of the inventory is due to schedule reductions."

Buyers are generally grateful for the higher inventories; they have had a chance to catch their breath. One of every four thinks he's better off than at the time of STEEL's last report. About 17 per cent think they are worse off; significantly, about the same number report lower inventories.

Deliveries—During the first quarter, deliveries improved a bit. The percentage of respondents reporting generally inadequate deliveries dropped from 40 to 35 per cent.

Undershipments bothered a few buyers. This comment from a Cleveland firm: "Ninety per cent of our steel is from mill orders, and while we try to anticipate deliveries, we still run into unusual delays from a few sources. Undershipments really ball things up."

Shortages—Of course not everyone could get what he wanted when he wanted it. Some even had to turn away business: A Chicago purchasing agent notes shortages of plate and seamless tubing and says: "Our production and customer service suffer accordingly."

Structural shapes, too: "We have had to turn down orders because we are unable to obtain certain sizes," reports the president of a Detroit firm. "Bookings are being reduced due to shortages," complains a Virginia buyer.

Deteriorating—"All deliveries are deteriorating. Structural shapes are out of control. Promises are of no value," says another east coast company. The word from Oklahoma: "Pardon the French, but the steel plate supply is no damn good." And Oregon: "The plate situation is critical."

As the comments indicate, plates and structurals are the most wanted items. With 65 per cent of STEEL's respondents reporting a shortage of some sort, almost half of them wanted more plates. About one-third said structurals were hard to find.

Trouble in July—Buyers around the country are already anticipating the coming labor talks. "The large inventory is carried to protect us against union demands," says a Florida pipe producer. "The answer to our position next quarter is in the hands of labor," believes an Ohio toolmaker. And a Pennsylvania purchasing agent concludes: "We are concerned about prospects for the third quarter because of steel's contract negotiations this summer."

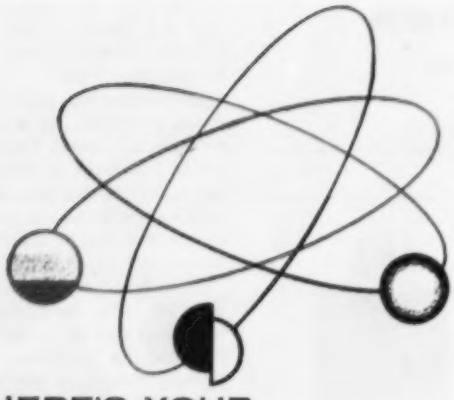
Sheets, Strip . . .

*Sheet & Strip Prices, Pages 151 & 152

Producers of hot and cold-rolled sheets will wind up the first half of this year with smaller carry-over than at any time in over a year. This will reflect cutbacks in automotive needs.

Sheetmakers continue to operate at capacity and are still finding ready markets for their entire production. But more shipments are going into inventory. This may be reflected later in some slackening in demand.

Eastern mills are having no trouble disposing of hot-rolled sheets. In fact, hot rolled generally is in tighter supply than cold rolled. The mills also are well booked up on enameling stock and the silicon grades. E. J. Hanley, president, Allegheny Ludlum Steel Corp., Pittsburgh, says his



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firm's silicon steel sales are at record levels.

Deliveries of galvanized sheets are becoming a little more extended than they were, but there is sufficient tonnage for current needs.

There is some stock accumulation in the immediate New York area. But many consumers are handicapped by lack of large storage facilities. Much tonnage is moving to stovemakers, furniture manufacturers, shelving fabricators and makers of light tanks and shipping containers.

A midwestern appliance maker reports noticeable easing in both hot-rolled and cold-rolled supplies. This firm no longer is resorting to premium-priced tonnage and conversion sheets in filling its needs. It still finds enameling sheets in tight supply. Sheet inventories, in some cases, are said to run 45 days and better.

Narrow cold-rolled strip schedules in New England are filled through June except for low carbon. Most area converters can book tonnage of low carbon and 430 stainless strip for June shipment.

Pittsburgh sheetmakers may revise their product mix in the third quarter should auto model change-overs result in further cuts in auto tonnage in July and August. More ingots may be shifted to production of tubing, plates and structurals.

Plates . . .

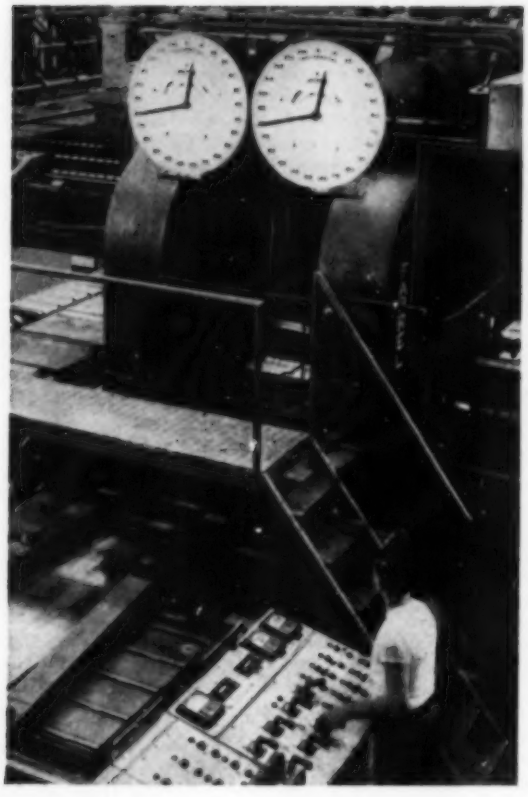
Plate Prices, Page 150

Colorado Fuel & Iron Corp. raised prices $11 per ton on carbon and abrasive resistance plates, effective Apr. 28. It now quotes carbon plates, $5.35, and abrasive resistance, $6.20, f.o.b. Claymont, Del. High strength low alloy and alloy plate prices are unchanged.

Most platemakers have opened order books for tonnage to be shipped beyond June 30. In most cases, mills are accepting business for the entire third quarter. But, in planning third quarter distribution, the producers are making allowances for a somewhat slower production rate in the period.

Most buyers would like to build up inventories as a hedge against a possible steel strike and higher prices this summer. However, they will consider themselves lucky if they get sufficient tonnage to meet their current consuming requirements.

Fabricators are not obtaining enough plates to meet current needs and have long since given up hope of building inventories soon. To complicate the situation, producers are allotting less tonnage in the third quarter—about 10 per cent less in some cases. They want to allow for



This 30" x 36" two-high, cold brass, breakdown mill is the largest ever designed for the nonferrous metals industry. Handles 3000 lb. bars, 25½" wide, 3" thick, and 120" long. Seven passes reduce these bars to flat metal .540" thick and 62 feet long.

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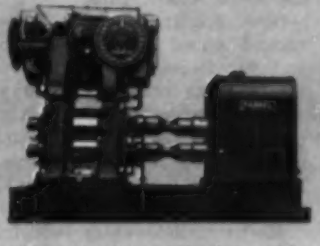
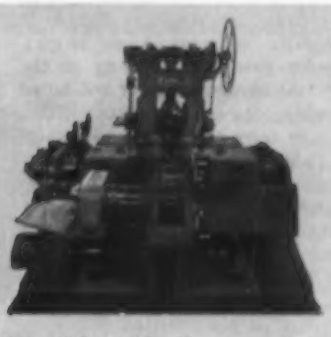


10" x 10" mill specially designed for close gauge control in continuous, high-speed, cold-rolling of high-carbon strip steel. High-powered screwdown permits gauge adjustment under full load.

Designed specifically for increasing aluminum foil production, this mill has 9" x 46" work rolls and 21" back-up rolls. Speed of operation can be varied to meet production requirements.



22" mill for cold-rolling commutator bars. Straightener and roll edger designed into assembly so bars of commonly used size can be straightened, edged and cold-rolled in one continuous operation under precise dimensional control.

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production curtailments due to hot weather and vacations.

Small tank builders' plate needs are heavier in New England, and some of them are getting a little more tonnage, light gage, from sheet-strip mills. But miscellaneous industrial consumers continue short of supplies. Structural shops are pressing a hunt for plates with only slight success at warehouses and premium-price suppliers.

A substantial proportion of current plate production is earmarked for heavy construction programs, carbuilding, pipe lines and integrated fabricating shops. Pittsburgh machinery builders will not get as much plate in the third quarter as they had expected. Builders of large material handling equipment, such as ore bridges, say delayed steel shipments may hold back some projects scheduled for completion this year.

Steel Bars . . .

Bar Prices, Page 150

Hot-rolled carbon bar business is brisk, though not so active as it was some months back. Some buyers are building stocks, and most producers are accepting orders for the third quarter. They are offering customers less tonnage than they allotted for the current quarter, expecting somewhat slower operations during the summer.

Cold-finished bars are moving fairly well, although shipments aren't what they were a few months ago. Alloy bars, both hot and cold, are in moderate demand.

While consumption is holding up well in New England (in fact, it is up slightly at some forge shops), bar order pressure is easing in the area. One hundred tons of hot-rolled bars were offered six consumers before they were taken for June shipment. More mills are offering additional hot-rolled tonnage, supplementing second quarter allotments.

Sales of cold-finished at Pittsburgh have leveled off. Inventory accumulation is not a major factor in sales there. Delivery of hot-rolled bars is improving in the district, but shipments are not on schedule.

Most sellers think bar buying will be off somewhat this summer, primarily because of current protective covering as a hedge against higher prices and a possible steel strike at midyear. Lower consuming requirements, particularly automotive, also are anticipated. Not much of a spurt in auto demand is expected until late summer.

Bolt and nut makers are not pressing quite so hard for bar tonnage. Fastener requirements of the auto builders and farm equipment manufacturers are down. This is reflected in inquiry from bolt and nut producers for steel bars. At the same time, there is still a lot of fastener tonnage moving to the automotive industry, and construction requirements are heavy. So are railroad equipment needs.

Wire . . .

Wire Prices, Pages 152 & 153

The seasonal pickup in merchant wire demand is disappointing, but sellers are still confident substantial volume business will develop. A late spring in many areas is hurting sales. Meanwhile, demand for manufacturers wire is holding up well, although automotive requirements are down somewhat. One eastern maker is booked into August on some grades. In general, the mills are not booked that far ahead.

With the exception of some alloys, screw manufacturers in New England are able to obtain wire when needed and in the volume required. There is some price hedging, but it is not extensive, and the screw shops are operating on a 45 to 60 day basis as regards carbon wire supply.

Spring steel sales by the Associated Spring Corp., Bristol, Conn., rolling mill are 16 per cent over those in the first quarter of last year.

Common wire and nails are meeting stiff competition from foreign countries on the West Coast.

Tubular Goods . . .

Tubular Goods Prices, Page 154

National Tube Division, U. S. Steel Corp., raised prices about 3 per cent on large diameter pipe, 14 through 36 in., effective Apr. 28. Other adjustments were made on certain small diameter standard and miscellaneous line pipe, principally in the lighter than standard wall thicknesses. An increase of 3 per cent was effected on pressure and mechanical tubing and certain oil country goods.

Demand for pressure tubing is increasing. Makers of oil country tubing have opened third quarter order books. They report steady demand. Buttweld pipe and light wall electricweld strip tubing are the only tubular products near normal supply.

Tin Plate . . .

Tin Plate Prices, Page 152

Mill price bases for electrolytic and hot-dipped tin plate, black plate and terne plate went up 40 cents per base box, Apr. 30, for the pricing period extending through Oct. 31. The over-all effect is an average increase of about 5 per cent.

United States Steel Export Co. advanced export bases for tin mill products 40 cents per base box, effective Apr. 30. The new prices, with freight included to New York, Philadelphia or Baltimore, are $10.40 base box for common coke (1.25-lb coating) superdraw; $9.08, USS Ferrostan 25 (0.25-lb coating, electrolytic) superdraw; $9.87, special coated manufacturing terne plate, superdraw; and $8.20, black plate, superdraw.

Tin mills are operating at capacity. One producer in the Pittsburgh area is working at 105 per cent. Some makers anticipate a slight decline in demand following the rush to cover needs before the price increase. But any letup in demand will be short lived, producers think.

Warehouse . . .

Warehouse Prices, Page 155

Distributors expect demand to remain active through May, possibly through the first half of June. They believe there is considerable hedge buying against a steel strike and higher prices at midyear.

What happens after mid-June will depend a lot on how steel labor contract negotiations are proceeding at that time.

Structural Shapes . . .

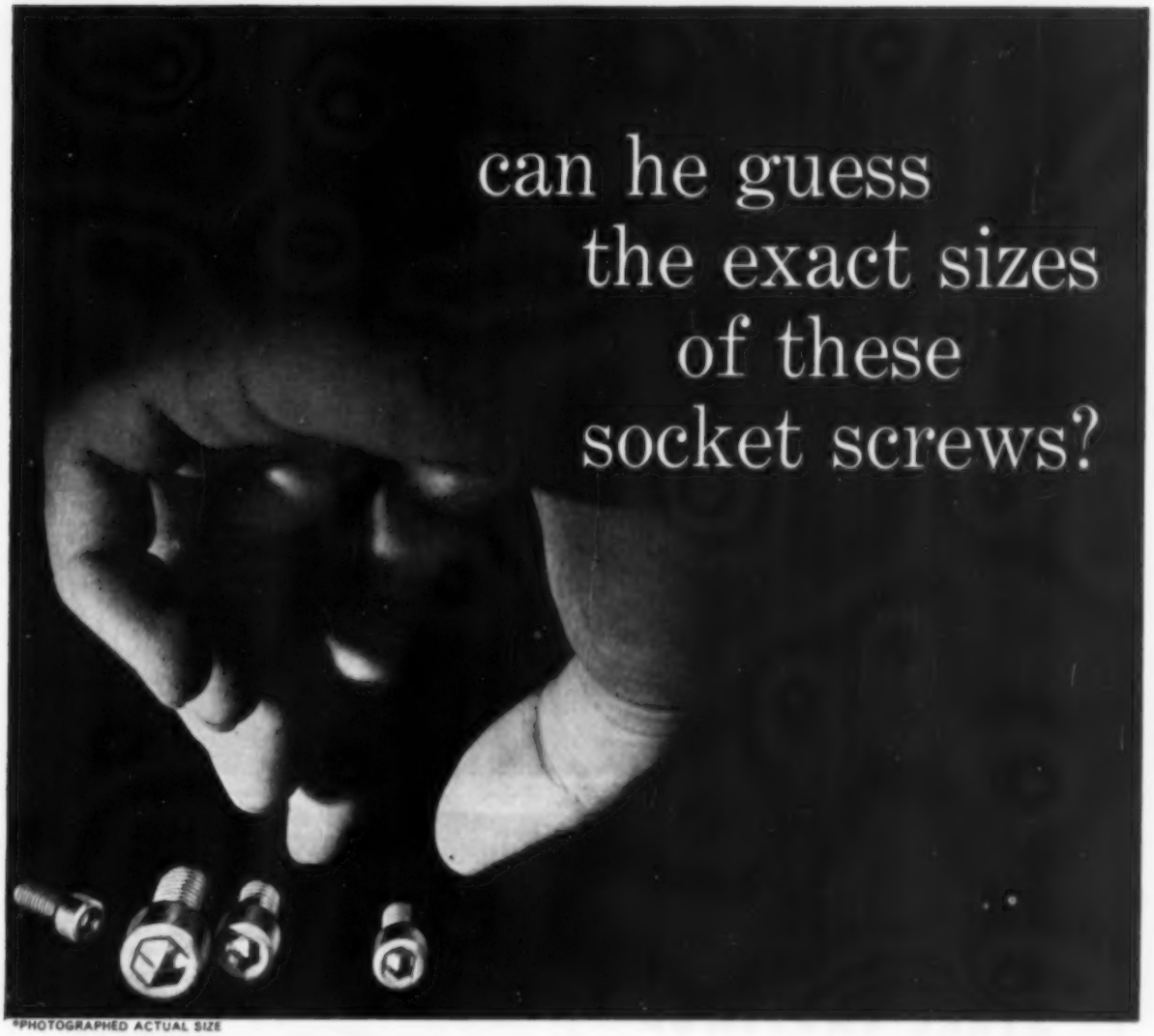
Structural Shape Prices, Page 150

Structural fabricating shops are cautious in accepting forward contracts because of the scarcity of plain material and the lag in deliveries. The shortage, particularly of wide flange sections, is resulting in delays in some construction and in redesigning of many projects for reinforced concrete. Illinois has bids on prestressed concrete bridges. If approved, this design will be used for 200 or more spans.

New England district shops are booked ahead up to eight months and in excess of structural allotments. The blankout of May tonnage by several producers is a serious setback. Only one fabricator bid on 750 tons for a high school in Lower Merion, Pa., and his bid involved a greatly extended delivery.

More multiple-story construction work is either active or in the planning stages in the New York metropolitan area than at any time since the 1920s. Bridge work in the East also continues active. Governor Meyner of New Jersey recently signed papers enabling the New York Port Authority to proceed with the large Narrows bridge, which involves many thousand tons of structural shapes.

Bethlehem Steel Corp. booked 7700 tons from the City of Chicago for the Calumet Skyway bridge on contract 7-D-1. Bids were taken Apr. 3.



*PHOTOGRAPHED ACTUAL SIZE

Experts can usually tell the size of a socket head cap screw simply by looking at it. "Green hands", however, must take time out to "mike" before returning left-overs to the tool crib. Tests show that even some experienced workers guess wrong as much as half the time. With Parker-Kalon *Size-Marked* Socket Head Cap Screws on the job, there's no need to guess or "mike" for size. The size is clearly marked on the head. This exclusive P-K feature saves valuable time and eliminates costly errors. It's just one more reason why you can be sure . . . "if it's P-K, it's O. K."

*SIZES (L. TO R.) NO. 10, 3/8", 5/16", 1/4"

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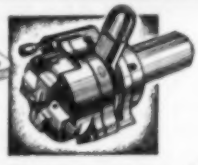

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STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

7700 tons, Calumet Skyway bridge, 7-D-1, for City of Chicago, bids Apr. 3, to Bethlehem Steel Co., Bethlehem, Pa.

3520 tons, bank and office building, National Bank of Commerce, San Antonio, Tex., to Mosher Steel Co., Dallas; Henry C. Beck Co., Dallas, general contractor.

2400 tons, plant buildings, American Radiator & Standard Sanitary Corp., Plainfield, Conn., to Topper & Griggs Inc. (Bethlehem Fabricators Inc.), Hartford; George A. Fuller Co., Boston, general contractor.

2100 tons, maintenance hangar, Smokey Hill Air Force Base, Salina, Kans., to Decatur Iron & Steel Co., Decatur, Ala.; T. C. Bateson Construction Co., Dallas, general contractor.

2020 tons, power plant, Jersey Central Power & Light Co., Sayreville, N. J., through Burns & Rowe Inc., general contractor, to Ingalls Iron Works Co., Birmingham, Ala.

2000 tons, 18-story office building, Dallas Federal Savings & Loan association, Dallas, to Mosher Steel Co., Dallas; Robert E. McKee Co. Inc., Dallas, general contractor.

1700 tons, power plant, New York State Electric & Gas Co., Ludlowville, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

850 tons, power plant, Tucson Gas, Electric & Light Power Co., Tucson, Ariz., through Sanderson & Power, agents, New York, to Allison Steel Mfg. Co., Phoenix, Ariz.

840 tons, state bridge work, Kings county, New York, through Horn Construction Co., general contractor, to Phoenix Bridge Co., Phoenixville, Pa.

710 tons, publishing plant, Boston Globe Co., Dorchester district, Boston, to American Bridge Division, U. S. Steel Corp., Pittsburgh; Turner Construction Co., Boston, general contractor.

600 tons, education building, International Business Machines Corp., Poughkeepsie, N. Y., through Eliot, Noyes & Associates, architects, to White Plains Iron Works, Peekskill, N. Y.

550 tons, addition, transit shed, Boston Port Commission, Castle Island, Boston, to Groisser & Shlager Iron Works, Somerville, Mass.; John Capobianco, Boston, general contractor.

500 tons, structurals-bars, high school, Dearborn, Mich., to Copco Steel & Engineering Co., Detroit (structurals), and McRae Steel Co. (reinforcing); A. W. Kutsche Co., Dearborn, general contractor.

445 tons, 127th street overpass, municipal department of public works, New York, through Melwood Construction Co., general contractor, to American Bridge Division, U. S. Steel Corp., Pittsburgh.

370 tons, high school, East Bridgewater, Mass., to Groisser & Shlager Iron Works, Somerville, Mass.; Tocci Bros. Construction Co., Newton, Mass., general contractor.

295 tons, bank building, Harvard Trust Co., Cambridge, Mass., to A. O. Wilson Structural Co., Cambridge.

135 tons, high school, East Millinocket, Me., to Vermont Structural Steel Co., Burlington, Vt.; H. P. Cummings Construction Co., Winthrop, Me., general contractor; reinforcing, Bancroft & Martin Rolling Mills Co., Portland, Me.

125 tons, state highway bridge, Southbridge, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; F. E. Daddario Co., Boston, general contractor.

115 tons, addition to tube plant, RCA Victor, Woodbridge, N. J., to Bule Steel Co., a northern New Jersey fabricator.

100 tons, boiler supports, power plant at Sparrows Point, Md., through Combustion Engineering Inc., to Bethlehem Steel Co., Bethlehem, Pa.

100 tons, Atwood's Corner school, Hartford, Conn., to Haarmann Structural Steel Co., Holyoke, Mass., (structurals) and Scherer Steel Co., Hartford, (reinforcing); A. F. Peaslee Inc., Hartford, general contractor.

STRUCTURAL STEEL PENDING

750 tons, high school, Lower Merion, Pa.

683 tons, ramp M structure over Packer avenue and 20th street, Philadelphia approaches, Walt Whitman bridge, contract P-12, bids closed by Delaware Port Authority, Camden, N. J., May 10.

345 tons, state highway bridge, Brooklyn-

Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$11.25
Old range nonbessemer	11.10
Mesabi bessemer	11.00
Mesabi nonbessemer	10.85
Open-hearth lump	12.10
High phos.	10.85

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)	nom. 18.00-20.00
Brazilian iron ore, 68-69%	13.00c, f.o.b. Victoria.

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$33.00-$35.50
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, delivery within six months, $1.15 nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, $1.05 nom.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 2.8:1	nom. $45.00-$50.00
48% 3:1	42.00-44.00
48% no ratio	34.00

South African Transvaal

44% no ratio	$19.00-$20.00
48% no ratio	33.00-35.00

Domestic

Rail nearest seller

48% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of mo content, mines, unpacked	$1.10

Antimony Ore

Per unit of lb content, c.i.f. seaboard

55-60%	$3.60-$3.85
60-65%	3.85-4.00

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Pa., New Savage, Md., St. Louis, $150.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Windham, Portsmouth, O., Hawstone, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty: Hays, Sproul, Hawstone, Pa., Niles, Warren, Windham, O., Leslie, Md., Athens, Tex., $145; Morrisville, Pa., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Ladle Brick (per 1000)

Dry Pressed: Ainey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 Per Cent: St. Louis, Mexico, Vandalia, Mo., $194; Danville, Ill., $197; Philadelphia, Clearfield, Pa., $201.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $241; Danville, Ill., $244; Philadelphia, Clearfield, Pa., $248.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Clearfield, Pa., Philadelphia, $286.

Sleeves (per 1000)

Rossdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

Nozzles (per 1000)

Rossdale, Pa., $253.70; Johnstown, Pa., $259.20; Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $258.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $195.80.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Bilimeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Nario, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk, ⅛-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅝-in. grains with fines: Baltimore, $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace	$13.75-14.50
Connellsville, foundry	16.00-17.00

Oven Foundry Coke

Birmingham, ovens	$25.65
Cincinnati, deld.	30.58
Buffalo, ovens	27.50
Buffalo, deld.	28.75
Camden, N. J., ovens	26.50
Chicago, ovens	27.00
Chicago, deld.	28.50
Detroit, ovens	27.50
Detroit, deld.	28.50
Pontiac, deld.	29.06
Saginaw, deld.	30.58
Erie, Pa., ovens	27.50
Everett, Mass., ovens	
New England, deld.	*28.55
Indianapolis, ovens	26.75
Ironton, O., ovens	26.00
Cincinnati, deld.	28.59
Kearny, N. J., ovens	26.75
Lone Star, Tex., ovens	19.50
Milwaukee, ovens	27.50
Neville Island, (Pittsburgh) Pa., ovens	26.25
Painesville, O., ovens	27.50
Cleveland, deld.	29.43
Philadelphia, ovens	26.50
St. Louis, ovens	28.50
St. Paul, ovens	26.50
Swedeland, Pa., ovens	26.50
Terre Haute, Ind., ovens	26.75

*Or within $4.85 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulphate	$42-$48
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-$39; 70%, $35-$36; 60%, $31-$32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Electrodes

Threaded with nipple, unboxed, f.o.b. plant

GRAPHITE

Diam	Inches Length	Per 100 lb
2	24	$52.50
2½	30	33.75
3	40	32.00
4	40	30.25
5½	40	30.00
6	60	27.25
7	60	26.75
8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25

CARBON

8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	96	10.05
30	84	10.20
40, 35	110	9.90
40	100	9.90

Killingly, Conn.; bids May 7, Hartford, Conn.; also 115 tons of reinforcing bars.

250 tons, 250-ft, three-span I-beam, 240-ft two-span girder and 40-ft single-span I-beam bridge; bids to Alaska Road Commission, Juneau, May 22.

200 tons, 344-ft, two-lane, welded-plate girder bridge; reinforced concrete beams and monolithic reinforced concrete deck; bids to G. W. Yates, purchasing agent, Portland, Oreg., May 22.

100 tons, including reinforcing bars, plant addition, Pacific Coast Paper Mills, Bellingham, Wash.; general contract to Howard S. Wright & Co. Inc., Seattle.

REINFORCING BARS . . .

REINFORCING BARS PLACED

4000 tons, two power dams, Snake river, for the Idaho Power Co., to Gate City Iron Works, Boise, Idaho; Morrison-Knudsen Co., Boise, general contractor.

1600 tons, Pelton dam, Oregon, for Portland General Electric Co., Portland, Oreg., to Mercer Steel Co., Portland; Guy F. Atkinson Co., South San Francisco, Calif., general contractor.

700 tons, five state highway bridges, contract 5, Northeast expressway, Revere, Mass., to Northern Steel Inc., Medford, Mass.; C. J. Maney Co. Inc., Lexington, Mass., general contractor.

535 tons, bank and office building, National Bank of Commerce, San Antonio, Tex., to Alamo Iron Works, Houston; Henry C. Beck Co., Dallas, general contractor.

500 tons, Shadle Park high school, Spokane, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle; Henry George & Sons, Spokane, general contractor.

500 tons, Noxon Rapids, Mont., power project for the Washington Water Power Co., Spokane, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle (partial award).

400 tons, Frank M. Black Junior High School, Houston, to Alamo Iron Works, Houston; Farnsworth & Chambers Co. Inc., Houston, general contractor; 75 tons of structurals to Commercial Iron Works, Houston.

320 tons, Jefferson parish courthouse, Gretna, La., to Orleans Materials & Equipment Co., New Orleans; R. F. Farnsworth & Co. Inc., New Orleans, general contractor; 45 tons structurals, Birmingham Ornamental Iron Co., Birmingham, Ala.

300 tons, reinforcing bars and piling, addition to transit shed, Castle Island, Boston, to Barker Steel Co., Boston (bars), and C. L. Guild Construction Co., Boston (piling); John Capobianco, Boston, general contractor.

260 tons, 16-story office building, Dallas Federal Savings & Loan Association, Dallas, to Mosher Steel Co., Dallas; Robert E. McKee Co. Inc., Dallas, general contractor.

200 tons, processing plant, Spokane, for Inland Empire Pea Growers Association, to Bethlehem Pacific Coast Steel Corp., Seattle; Henry George & Sons, Spokane, general contractor.

200 tons, buildings, American Radiator & Standard Sanitary Corp., Plainfield, Conn., to Plantations Steel Co., Providence, R. I.; George A. Fuller Co., Boston, general contractor.

100 tons, maintenance hangar, Smokey Hill Air Force Base, Salina, Kans., to Capitol Iron & Steel Co., Oklahoma City, Okla.; T. C. Bateson Construction Co., Dallas, general contractor.

100 tons, Washington state highway bridge, Aberdeen, Wash., to Northwest Steel Rolling Mills Inc., Seattle.

REINFORCING BARS PENDING

200 tons or more, five-story library building, Vancouver, B. C.; general contract to Commonwealth Construction Co., Vancouver, low at $1,661,636.

PLATES . . .

PLATES PLACED

260 tons, water storage reservoir, Mundelein, Ill., to Chicago Bridge & Iron Co., Chicago.

250 tons, 500,000-gal elevated, water storage tank, Arlington, Va., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

PLATES PENDING

750 tons, 1-million-gal ground level and one 300,000-gal elevated storage tanks, static missile test area, Holloman Air Force Base, Alamogordo, N. Mex.; bids to Corps of Engineers, Albuquerque, N. Mex.

135 tons, 250,000-gal elevated water tank; Veterans Hospital, Aspinwall Division, Pittsburgh, bids May 15, Washington.

100 tons, including shapes, 99-ft car ferry for Alaska Road Commission; general award to J. M. Martinac Shipbuilding Co., Tacoma, Wash., low at $321,870.

100 tons, also shapes, four 50-ft pipe pontoon barges, with steel houses; bids to Portland, Oreg., May 11.

PIPE . . .

CAST IRON PIPE PENDING

300 tons, 31,000-ft of 10 to 4-in. distribution mains; also alternatives; bids to West Richland, Wash., May 7.

200 tons, also 100,000-gal steel tank and accessories, King County District No. 79; alternatives considered; bids to George L. Millmann 18120 68th N.E., Kenmore, Wash., May 14.

RAILS, CARS . . .

LOCOMOTIVES PLACED

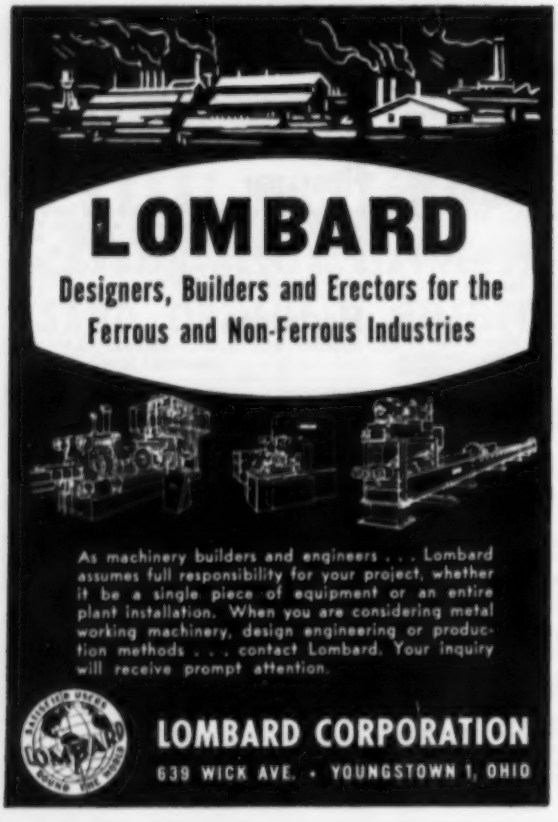
British Columbia Electric Railways, two 900-hp diesel units, to General Motors Diesel Ltd., London, Ont.

RAILROAD CARS PLACED

Louisville & Nashville, awarded 2000 seventy-ton coal hopper cars and 100 seventy-ton covered hopper cars to Pullman-Standard Car Mfg. Co., Chicago.

Seaboard Air Line, cast steel bodies and steel frames for three 125-ton depressed center flatcars, purchased for assembly at its Portsmouth, Va., shops.

Union Tank Car Co., 75 tank cars, ranging from 8000-gal to 10,600-gal capacity, to own shops.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for cutting
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• CHANNELS & • WIRE ROPE
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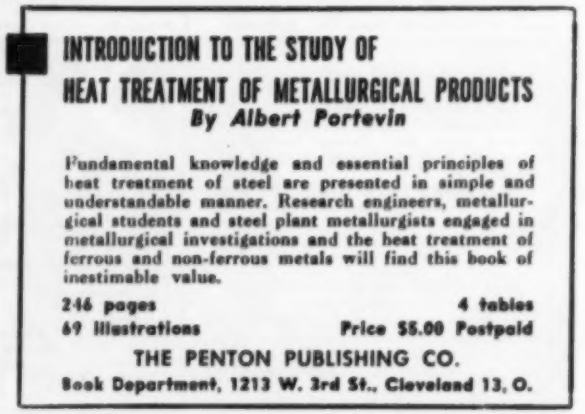
INTRODUCTION TO THE STUDY OF
HEAT TREATMENT OF METALLURGICAL PRODUCTS
By Albert Portevin
Fundamental knowledge and essential principles of heat treatment of steel are presented in simple and understandable manner. Research engineers, metallurgical students and steel plant metallurgists engaged in metallurgical investigations and the heat treatment of ferrous and non-ferrous metals will find this book of inestimable value.
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69 illustrations
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Current Ferroalloy Quotations

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $96.50; 19-21% Mn, 1-3% Si, $94; 16-19% Mn, $92.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $215. Duquesne, Johnstown, Sheridan, Pa.; Philo, O.; Tacoma, Wash.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $223 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 31.95c per lb of contained Mn, carload packed 33c, ton lots 34.5c, less ton 35.7c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 22.85c per lb of contained Mn, packed, carload 23.9c, ton lot 25.5c, less ton 26.7c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 31.5c; 2000 lb to min carload, 33.5c; 250 lb to 1999 lb, 35.5c; less than 250 lb, 36.5c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12c per lb of alloy. Packed, c.l. 13c, ton 13.45c, less ton 14.45c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37 f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%. Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 26.25c per lb of contained Cr; c.l. packed 27.5c, ton lot 29.25c, less ton 30.65c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 31.75c per lb contained Cr, 0.02% max 38.50c, 0.03% max 38c, 0.06% max 36.50c, 0.1% max 36c, 0.15% max 35.75c, 0.2% max 35.50c, 0.5% max 35.25c, 1.0% max 34c, 1.5% max 33.85c, 2.0% max 33.75c. Ton lot, add 3.1c, less ton add 4.8c. Carload packed add 1.45c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 2 in. x D, bulk 27.4c per lb contained Cr. Packed, c.l. 28.7c, ton 30.5c, less ton 32c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed 8 M x D, 19.6c per lb of alloy, ton lot 20.85c; less ton lot, 22.05c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 39.05c per lb of contained Cr; 1" x down, bulk 39.8c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2 max). Contract, carlot, packed 2" x D plate (about ¼" thick) $1.25 per lb, ton lots $1.27, less ton lots $1.29. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.20. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.30.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.33 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-39% Ferrosilicon: Contract, carload, lump, bulk, 20.6c per lb of contained Si. Packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.75c per lb of contained Si. Packed, c.l. 14.85c, ton lot 16.3c, less ton 17.95c. F.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.2c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 14.5c per pound contained silicon. Packed, c.l. 16.2c, ton lots, 18c; less ton, 19.35c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 15.4c per lb of contained Si. Packed, c.l. 17.05c, ton lot 18.7c, less ton 19.95c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si. Packed, c.l. 19.95c, ton lot 21.35c, less ton 22.4c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 98% Si, 0.75% max Fe, 0.07 max Ca). C.l. lump, bulk, 20.5c per lb of Si. Packed, c.l. 21.95c, ton lot 23.25c, less ton 24.25c. Add 0.5c for max 0.03 Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lots packed 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 8.5c per lb of alloy. Packed, c.l. 9.5c, ton lot 10.65c, less ton 11.5c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 26.25c per lb of alloy, ton lot 27.4c, less ton 28.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 22c per lb of alloy, carload packed 23.05c, ton lot 24.95c, less ton 25.95c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 21.5c per lb of alloy, carload packed 22.95c, ton lot 25.25c, less ton 26.75c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3⅝ lb each and containing 2 lb of Cr). Contract, carload, bulk, 16.95c per lb of briquet, carload packed in box pallets 17.15c, in bags 17.85c; 3000 lb to c.l. in box pallets 18.35c; 2000 lb to c.l. in bags, 19.05c; less than 2000 lb in bags 19.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing 2 lb of Mn). Contract, carload, bulk 13c per lb of briquet, c.l. packed, pallets 13.2c, bags 14c; 3000 lb to c.l., pallets 14.4c; 2000 lb to c.l. bags, 15.2c, less ton 16.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 13.55c per lb of briquet, c.l. packed, pallets, 13.75c; bags 14.55c, 3000 lb to c.l., pallets, 14.95c; 2000 lb to c.l., bags, 15.75c; less ton 16.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.15c per lb of briquet; packed, pallets, 7.35c; bags, 8.15c; 3000 lb to c.l., pallets, 8.95c; 2000 lb to c.l. bags 9.75c; less ton 10.65c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing 1 lb of Si). Carload, bulk 7.3c. Packed, pallets 7.5c; bags 8.30c; 3000 lb to c.l. pallets 9.1c; 2000 lb to c.l. bags 9.9c; less ton 10.8c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.33 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.45 per lb of contained W; 2000 lb W to 5000 lb W, $3.55; less than 2000 lb W, $3.67. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min C 0.30% max). Ton lots, 2" x D, $4.65 per lb of contained Cb plus Ta, delivered; less ton lots $4.70.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ½ in. x 12 M, 18.5c per lb of alloy, ton lots 19.65c, less ton 20.9c. Delivered. Spot, add 0.25c.

Graphidox No. 8: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18.5c per lb of alloy, ton lots 19.65c; less ton lots 20.9c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 17.2c per lb of alloy; ton lots 18.7c; less ton lots 19.95c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 17.50c. Packed c.l. 18.50c, 2000 lb to c.l. 19.50c, less than 2000 lb 20c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base; carload, f.o.b. sellers' works, Mt. Pleasant, Elgio, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, Pa., $1.54 in all sizes except powdered which is $1.66; Washington, Pa., furnace, any quantity $1.46.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa.; $1.31 in cans; in bags, $1.30, f.o.b. Langeloth, Pa.; $1.24, Washington, Pa.

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COIN SLOT SELECTOR
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Cleereman drill press is factory equipped with the special A-B automatic motor control panel shown here, using strictly standard components

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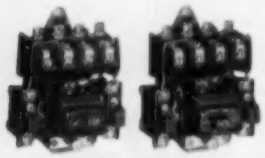

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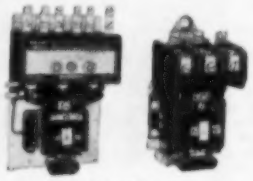

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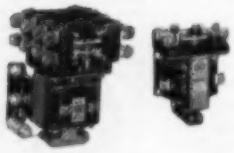

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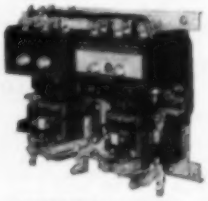

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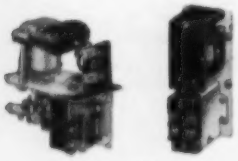

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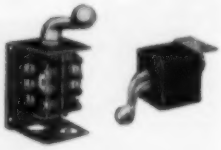

DRUM CONTROLLERS
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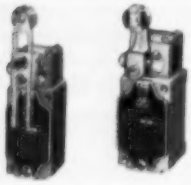

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Scrap . . .

Scrap Prices, Page 168

Pittsburgh—A large steel producer bought scrap last week for Monongahela valley mills, paying $54 for No. 1 heavy melting, $47 for No. 2 heavy melting and $45 for No. 2 bundles. Price of No. 1 heavy melting was $2 a ton under previous quotations. Spring weather and rising prices combine to make more material available. This results in lower prices for many grades. Despite heavy blast furnace operations and strong demand for machine shop turnings and cast iron borings, quotations for these grades dipped about $1 on the average last week. Railroad scrap quotations were lower. Cast iron grades are steady.

Philadelphia—Following recent purchases by U. S. Steel's Fairless Works, prices on the major open-hearth grades have leveled off at $57, delivered, for No. 1 heavy melting, No. 1 bundles and No. 1 busheling; $48 for No. 2 heavy melting; and $46 for No. 2 bundles. Electric furnace bundles are holding nominally at $58, delivered.

Purchases for Fairless are estimated at around 20,000 tons, indicating buying about half the rate of regular monthly requirements and that remaining needs are being drawn from stock. Buying by other consumers is hand to mouth.

Exports from Philadelphia continue light, and there seems to be some easing in purchases by Europe. There is an ever swelling volume of inquiry from Japan—not only on the Pacific Coast but in increasing measure at Gulf ports.

Cleveland—Automotive lists went at $3 to $4 per ton under a month ago. As a result, and with mill buying sluggish, the scrap market in general is off about $2 on the steelmaking grades and about $1 on the foundry grades. Except for one substantial purchase of low phos material at $60 in the Valley last week, representative sales were absent. Recent high prices have served to bring out large tonnages and as a result consumers are not pressing the market for material.

Boston—For outside shipment, No. 1 heavy melting steel is off $1-$1.50 a ton to $47, shipping point. For district mill delivery, $49-$50 is being paid by brokers. There is a slightly softer tone in No. 2 steel bundles. No. 1 heavy is $50 and No. 2 heavy melting $44, f.a.s., delivered dock for export. Cast scrap is slightly firmer. At current prices, tonnage is coming out in good volume against old orders.

New York—The edge is off the brokers' buying market here. Prices are unchanged, but the market tone is easier. High prices have resulted in a better flow of scrap, one that appears adequate to meet demand.

Buffalo—The scrap market situation here appears mixed. On the bullish side is a report that some industrial lists have been closed at higher prices. On the bearish side, there are reports of price weakness at other consuming centers. Some dealers anticipate lower prices on business for May delivery.

At the moment, prices are unchanged. Cast iron is firm with consumers paying $51 for cupola, delivered. No. 1 heavy melting is $55-$56 on the basis of shipments to other districts. Low phos is steady at $58, and railroad specialties are quoted around $60.

Cincinnati — Prices have moved downward in a technical reaction to the recent upswing. The trade does not anticipate any prolonged downtrend. Prices on blast furnace and foundry grades average $1 off. Buyers are marking time pending market developments.

Detroit—Except for a slight softening in prices on the No. 1 grades, the scrap market here is relatively firm. Ingot production currently is estimated at 99.5 per cent, against 97.4 a week ago and 92 a year ago.

Chicago—For the most part, little activity is reflecting a wait-and-see attitude, scrap men here report. Railroad scrap has been the exception, and some sales at a $1 increase or so have been reported. One dealer reports sales of rail axles to a mill at $79.

Birmingham—There is little open-hearth scrap moving to southern mills, and the movement to the North seems to be slowing down. Brokers say this indicates a leveling off of prices in the North. Dealers,

(*Please turn to page* 170)

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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

May 2	$55.00
Apr. 25	55.33
Mar. Avg.	50.21
Apr. 1955	36.73
Apr. 1951	44.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania

PITTSBURGH

No. 1 heavy melting	*53.00-54.00*
No. 2 heavy melting	*46.00-47.00*
No. 1 bundles	*53.00-54.00*
No. 2 bundles	*44.00-45.00*
No. 1 busheling	*53.00-54.00*
Machine shop turnings	*39.00-40.00*
Mixed borings, turnings	*39.00-40.00*
Short shovel turnings	*42.00-43.00*
Cast iron borings	*42.00-43.00*
Cut structurals, 3 ft lengths	64.00-65.00
Heavy turnings	50.00-51.00
Punchings & plate scrap	64.00-65.00
Electric furnace bundles	62.00-63.00

Cast Iron Grades

No. 1 cupola	52.00-53.00
Charging box cast	48.00-49.00
Heavy breakable cast	48.00-49.00
Unstripped motor blocks	35.00-36.00
No. 1 machinery cast	57.00-58.00

Railroad Scrap

No. 1 R.R. heavy melt	*64.00-65.00*
Rails, 2 ft and under	*73.00-74.00*
Rails, 18 in. and under	*74.00-75.00*
Rails, random lengths	*68.00-69.00*
Railroad specialties	69.00-70.00

Stainless Steel Scrap

18-8 bundles & solids	345.00-355.00
18-8 turnings	240.00-250.00
430 bundles & solids	110.00-120.00
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting	*54.00-55.00*
No. 2 heavy melting	*46.00-47.00*
No. 1 bundles	*54.00-55.00*
No. 2 bundles	*39.00-40.00*
No. 1 busheling	*54.00-55.00*
Machine shop turnings	32.00-33.00
Mixed borings, turnings	36.00-37.00
Short shovel turnings	36.00-37.00
Cast iron borings	36.00-37.00
Low phos.	*57.00-58.00*
Cut structural plates 2 ft and under	*60.00-61.00*
Alloy free, short shovel turnings	*37.00-38.00*
Electric furnace bundles	*56.00-57.00*

Cast Iron Grades

No. 1 cupola	*57.00-58.00*
Charging box cast	*47.00-48.00*
Stove plate	*53.00-54.00*
Heavy breakable cast	*47.00-48.00*
Unstripped motor blocks	33.00-34.00
Brake shoes	*43.00-44.00*
Clean auto cast	*57.00-58.00*
Burnt Cast	*43.00-44.00*
Drop broken machinery	*57.00-58.00*

Railroad Scrap

No. 1 R.R. heavy melt.	60.00-61.00
R.R. malleable	65.00-66.00
Rails, 2 ft and under	73.50-74.50
Rails, 18 in. and under	72.00-73.00
Rails, random lengths	68.00-69.00
Cast steel	61.00-62.00
Railroad specialties	62.00-63.00
Uncut tires	63.00-64.00
Angles, splice bars	68.00-69.00
Rails, rerolling	71.00-72.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	345.00-355.00
18-8 turnings	205.00-215.00
430 clips, bundles, solids	*100.00-110.00*
430 turnings	*50.00-60.00*

YOUNGSTOWN

No. 1 heavy melting	*57.00-58.00*
No. 2 heavy melting	*44.00-45.00*
No. 1 bundles	*57.00-58.00*
No. 2 bundles	*41.00-42.00*
No. 1 busheling	*57.00-58.00*
Machine shop turnings	33.00-34.00
Short shovel turnings	37.00-38.00
Cast iron borings	37.00-38.00
Low phos.	*59.00-60.00*
Electric furnace bundles	58.00-59.00

Railroad Scrap

No. 1 R.R. heavy melt.	64.00-65.00

CHICAGO

No. 1 heavy melting	53.00-54.00
No. 2 heavy melting	*44.00-45.00*
No. 1 factory bundles	47.00-48.00
No. 1 dealer bundles	53.00-54.00
No. 2 bundles	*39.00-40.00*
No. 1 busheling	53.00-54.00
Machine shop turnings	*29.00-31.00*
Mixed borings, turnings	33.00-34.00
Short shovel turnings	33.00-34.00
Cast iron borings	33.00-34.00
Cut structurals, 3 ft	57.00-58.00
Punchings & plate scrap	58.00-59.00

Cast Iron Grades

No. 1 cupola	52.00-53.00
Stove plate	46.00-47.00
Unstripped motor blocks	40.00-41.00
Clean auto cast	55.00-56.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	*59.00-60.00*
R.R. malleable	63.00-64.00
Rails, 2 ft and under	71.00-72.00
Rails, 18 in. and under	*74.00-75.00*
Angles, splice bars	66.00-67.00
Rails, rerolling	72.00-73.00

Stainless Steel Scrap

18-8 bundles & solids	380.00-395.00
18-8 turnings	270.00-280.00
430 bundles & solids	105.00-110.00
430 turnings	55.00-60.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*53.00*
No. 2 heavy melting	*44.00*
No. 1 bundles	*53.00*
No. 2 bundles	37.00
No. 1 busheling	*53.00*
Machine shop turnings	24.00
Mixed borings, turnings	24.00
Short shovel turnings	28.00
Punchings & plate scrap	65.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	39.00
Stove plate	38.00
Heavy breakable	38.00
Unstripped motor blocks	27.00
Clean auto cast	52.00
Malleable	52.00

BIRMINGHAM

No. 1 heavy melting	*39.00-40.00*
No. 2 heavy melting	*37.00-38.00*
No. 1 bundles	*39.00-40.00*
No. 2 bundles	*32.00-33.00*
No. 1 busheling	*39.00-40.00*
Cast iron borings	21.50-22.50
Short shovel turnings	32.00-33.00
Machine shop turnings	31.00-32.00
Electric furnace bundles	44.00-45.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.50-48.00
Stove plate	44.50-45.50
Bar crops and plate	52.00-53.00
Structural & plate, 2 ft	51.00-52.00
Unstripped motor blocks	37.00-38.00
Charging box cast	32.00-33.00
No. 1 wheels	39.00-40.00

Railroad Scrap

No. 1 R.R. heavy melt.	*50.00-51.00*
Rails, 18 in. and under	*63.00-64.00*
Rails, rerolling	*65.00-66.00*
Rails, random lengths	*60.00-61.00*
Angles, splice bars	*59.00-60.00*

PHILADELPHIA

No. 1 heavy melting	*57.00*
No. 2 heavy melting	*48.00*
No. 1 bundles	*57.00*
No. 2 bundles	*46.00*
No. 1 busheling	*57.00*
Electric furnace bundles	*58.00†*
Mixed borings, turnings	39.00
Machine shop turnings	38.00
Short shovel turnings	42.00
Heavy turnings	52.00
Structurals & plates	59.00-60.00
Couplers, springs, wheels	62.00-63.00
Rail crops, 2 ft & under	68.00

Cast Iron Grades

No. 1 cupola	51.00-52.00
Malleable	70.00
Heavy breakable cast	54.00
Drop broken machinery	56.00

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	49.00-50.00
No. 2 heavy melting	40.00-41.00
No. 1 bundles	49.00-50.00
No. 2 bundles	37.00-38.00
Machine shop turnings	29.50-30.50
Mixed borings, turnings	31.00-32.00
Short shovel turnings	33.00-34.00
Low phos. (structural & plate)	50.00-51.00

Cast Iron Grades

No. 1 cupola	43.00-44.00
Unstripped motor blocks	33.00-35.00
Heavy breakable	46.00-47.00

Stainless Steel

18-8 sheets, clips solids	320.00-325.00
18-8 borings, turnings	*165.00-175.00*
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*47.00*
No. 2 heavy melting	*37.00-37.50*
No. 1 bundles	*47.00*
No. 2 bundles	*35.00-35.50*
No. 1 busheling	46.00-47.00
Machine shop turnings	28.00-28.50
Mixed borings, turnings	29.00-29.50
Short shovel turnings	31.00-31.50
No. 1 cast	*44.00-44.50*
Mixed cupola cast	*42.50-43.00*
No. 1 machinery cast	*45.50-46.00*

BUFFALO

No. 1 heavy melting	55.00-56.00
No. 2 heavy melting	41.00-42.00
No. 1 bundles	55.00-56.00
No. 2 bundles	38.00-39.00
No. 1 busheling	55.00-56.00
Mixed borings, turnings	31.00-32.00
Machine shop turnings	31.00-32.00
Short shovel turnings	34.00-35.00
Cast iron borings	31.00-32.00
Low phos.	57.00-58.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	50.00-51.00
No. 1 machinery	54.00-55.00

Railroad Scrap

Rails, random lengths	58.00-59.00
Rails, 3 ft and under	64.00-65.00
Railroad specialties	59.00-60.00

CINCINNATI

(Broker's buying prices; f.o.b. shipping point)

No. 1 heavy melting	*52.00-53.00*
No. 2 heavy melting	*42.00-43.00*
No. 1 bundles	*52.00-53.00*
No. 2 bundles	*39.00-40.00*
No. 1 busheling	*52.00-53.00*
Machine shop turnings	*31.00-32.00*
Mixed borings, turnings	*31.50-32.50*
Short shovel turnings	*34.50-35.50*
Cast iron borings	*31.50-32.50*
Low phos., 18 in.	*57.00-58.00*

Cast Iron Grades

No. 1 cupola	*49.00-50.00*
Heavy breakable cast	*47.00-48.00*
Charging box cast	*47.00-48.00*
Drop broken machinery	*57.00-58.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*60.00-61.00*
Rails, 18 in. and under	*69.00-70.00*
Rails, random lengths	*61.00-62.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	45.00
No. 2 heavy melting	42.50
No. 1 bundles	45.00
No. 2 bundles	38.50
No. 1 busheling	45.00
Machine shop turnings	28.00
Short shovel turnings	29.50

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	45.00
Heavy breakable cast	43.00
Unstripped motor blocks	43.00
Brake shoes	45.00
Clean auto cast	48.00
Stove plate	43.00

Railroad Scrap

No. 1 R.R. heavy melt.	57.50
Rails, 18 in. and under	70.00
Rails, random lengths	65.00
Rails, rerolling	72.50
Angles, splice bars	60.00

SEATTLE

No. 1 heavy melting	*44.00*
No. 2 heavy melting	*40.00*
No. 1 bundles	35.00
No. 2 bundles	*30.00*
No. 2 bundles	17.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	15.00-16.00
Electric furnace, bundles	52.00-55.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*45.00*
Heavy breakable cast	35.00
No. 1 wheels	35.00
Unstripped motor blocks	30.00
Clean motor blocks	35.00
Stove plate (f.o.b. plant)	30.00
Brake shoes	30.00

Railroad Scrap

Rails, random lengths	38.00

LOS ANGELES

No. 1 heavy melting	38.00
No. 2 heavy melting	32.00
No. 1 bundles	37.00
No. 2 bundles	28.00
Machine shop turnings	17.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	42.00

SAN FRANCISCO

No. 1 heavy melting	36.00
No. 2 heavy melting	30.00
No. 1 bundles	35.00
No. 2 bundles	26.00
No. 1 busheling	36.00
Machine shop turnings	20.00-23.00
Mixed borings, turnings	20.00-23.00
Cast iron borings	20.00-23.00
Short shovel turnings	25.00
Cut structurals	45.00
Heavy turnings	20.00-23.00
Punchings & plate scrap	44.00

Cast Iron Grades

No. 1 cupola	45.00
Charging box cast	35.00
Stove plate	39.00
Heavy breakable cast	36.00
Unstripped motor blocks	32.00
Brake shoes	35.00
Clean auto cast	45.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	50.00

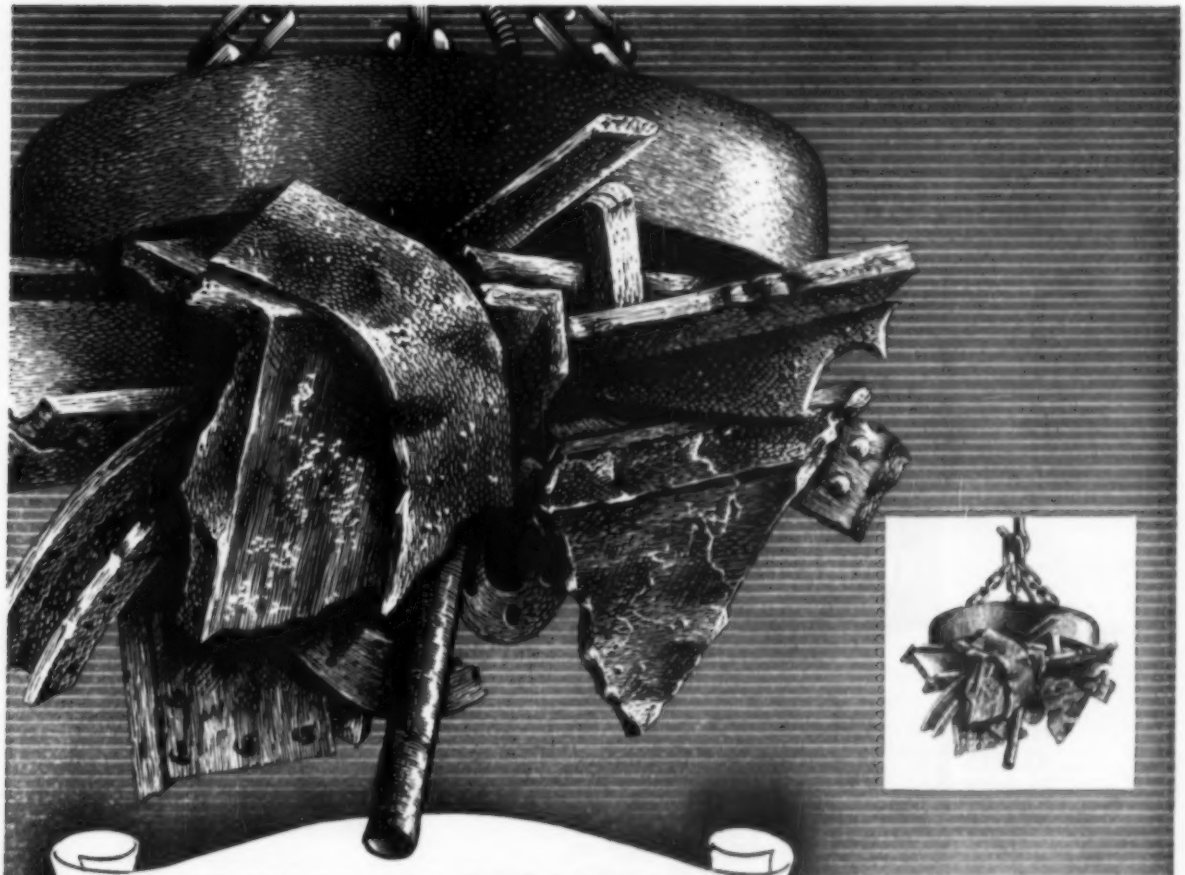
HAMILTON, ONT.

No. 1 heavy melting	50.50
No. 2 heavy melting	46.50
No. 1 bundles	50.50
No. 2 bundles	43.00
Mixed steel scrap	44.50
Mixed borings, turnings	24.00
Rails, remelting	58.50
Busheling, new factory: Prepared	48.50
Unprepared	44.50
Short steel turnings	27.50

Cast Iron Grades†

No. 1 machinery cast	50.00

†F.o.b., shipping point.



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MICRO-FOG
Model 33AF-16
Lubro-Control Unit

One lubricator completely lubricates the machine—provides better lubrication—results in quicker, easier maintenance.

THE LATEST ADVANCEMENT IN CENTRALIZED LUBRICATION

. . . for up to 1000 bearing inches*

for
BEARINGS
GEARS
CHAINS
CAMS
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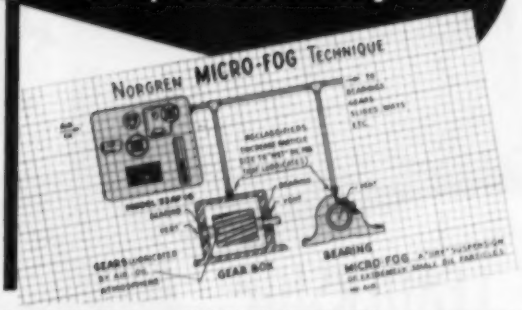
Other Machine Components



AUTOMATIC MICRO-FOG LUBRICATION—The 33AF-16 Unit automatically creates a finely divided air-borne oil fog which can be uniformly distributed through complex piping systems to multiple lubrication points.

LARGE LUBRICATING CAPACITY—A single unit can completely lubricate even the largest machines—up to 1000 bearing inches.

AUTOMATIC ALARM CONTROLS—Two pressure switches and a float-controlled switch are provided to automatically actuate an alarm system or controls when air pressure fails, when excessive pressure develops in the oil reservoir, or when the oil supply needs replenishing.

COMPACT, COMPLETE UNIT—Although only 12" x 11" x 9" in size, this lubricator contains all necessary controls plus a 2-gallon oil reservoir—enough oil for 12 hours lubrication at maximum MICRO-FOG output.

AUTOMATIC DRAIN FILTER—Protects entire equipment from abrasive and corrosive air line contaminants. Drains collected liquids automatically.

PRESSURE REGULATOR—Accurately regulates air pressure for most efficient lubrication.

VISUAL OIL FEED—Oil feed dome on front of unit provides a quick visual indication of proper operation of lubricator.

TWO AIR SUPPLY INLETS—Both are ½". One is at left side, one in back of unit. The most convenient inlet can be used, the other plugged.

FOUR MICRO-FOG OUTLETS—Three outlets are 1¼", one is 2" with a female tapered thread. One or more may be used.

AUXILIARY AIR TAKE-OFF—A ⅛" take-off is provided in top of unit to supply air for pressure jet reclassifiers if required.

SOLENOID VALVE—Coordinates operation of the lubricator with starting and stopping of machine.

TWO ELECTRICAL INLETS—For ¾" conduit—conveniently located at left end and at back of unit lead to splash-proof terminal compartment. Either or both may be used.

Norgren Co.
3412 So. Elati St., Englewood, Colo.

*For complete data on Norgren MICRO-FOG 33AF-16 Lubro-Control Unit, call your nearby Norgren Representative listed in your telephone directory—**or WRITE THE FACTORY FOR BULLETIN 531.**

Wherever Air is Used in Industry

(*Concluded from page 167*)

however, are shipping about everything that comes in to them, either to northern mills or for export. They are unable to build stocks. Specialty items are strong in this area, while other grades are steady. The cast iron market is quiet.

St. Louis—The scrap market held stable last week, demand continuing strong with no appreciable changes evident in prices. No shifts in price ranges of regular or rail scrap grades were reported.

Los Angeles—Large scrap dealers say their first quarter sales were above those in the like period a year ago. Smaller interests, however, report the contrary. Increasing softness in the market is noted.

San Francisco—An increase in steel scrap prices is said to be imminent. Only moderate advances are indicated.

Seattle—Scrap prices have advanced $4 to $5 a ton in this area. Dealers predict further increases because the market is in a strong position. Business is active, receipts satisfactory and local consumption is heavy. Exports are large. Mill inventories are substantial but not excessive.

Quotations: No. 1 heavy melting steel, $44; No. 2, $40; No. 2 bundles, $30; and No. 1 cupola, $45-$50.

CLASSIFIED

FOR SALE—HIGH VOLTAGE X-RAY UNIT Kelly-Koett 400 kv constant potential x-ray generator having full wave rectification and output of 20 roentgens per minute, using 7 mm of copper filtration. Adaptable for industrial radiography. Write Box 422, STEEL, Penton Bldg., Cleveland 13, Ohio.

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STEEL AND STAINLESS TUBING salesman required by nationally known manufacturer for Detroit Area. State experience, full particulars. Replies will be held confidential. Box No. 419, STEEL, Penton Bldg., Cleveland 13, Ohio.

ONLY THE BEST
We need competent metallurgist who likes people—therefore enjoys success in technical sales; who knows ferrous melting; who likes to guide his own destiny—therefore aspires to management; who is resourceful, imaginative, creative—therefore above average. Knowledge of tool, stainless, superalloys desirable. Home base will be Detroit area. Tell us about yourself and we'll do the same. WalMet, 1999 Guoin, Detroit 7, Mich.

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TOOL ENGINEER. Die design experience deep draws and high production progressive dies. Age 47 B.S. Degree. Write Box 416, STEEL, Penton Bldg., Cleveland 13, Ohio.

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SALARIED POSITIONS $5,000 to $35,000. We offer the original personal employment service (established 46 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. BIXBY, INC., 565 Brisbane Bldg., Buffalo 3, N.Y.

—METALS—

MARKET ANALYST

Excellent opportunity offer preferably for metallurgical or mechanical engineer who has done market research work on potential for metals or metal products; to take charge of market research work on non-ferrous metals in large firm located in New York City. Work will be on lead, zinc, bronze, nickel, titanium metal and new products.

Reply Box 418, STEEL

Penton Bldg., Cleveland 13, Ohio

Stating previous experience and salary requirements.

ENGINEERING EXECUTIVE

Rapidly expanding steel company has opening for engineer whose administrative qualifications include the supervision of design, construction and layout of rolling mills—blast furnaces and steel making facilities.

Here is an outstanding opportunity if your abilities and experience meet the needs of this position.

Send complete resume, including salary requirements, to:

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BY REPUTABLE MANUFACTURER

A man experienced in the manufacture of Machine Screws—Must be expert Header Mechanic and assume complete charge. Can purchase stock in company. Please supply full information and expected remuneration.

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Penton Bldg. Cleveland 13, Ohio

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Permanent positions for structural draftsmen having at least three years experience, with structural steel fabricators, on bridge and building work. Modern air-conditioned office with all employe benefits.

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Manufacturing Vice President

Foreign Operations

This is an unusual opportunity for a top executive qualified to direct our foreign manufacturing facilities. We are a successful American manufacturer of consumer metal products with sales exceeding $100,000,000 and our operations are world-wide.

This man will operate from our home office in the United States and will report directly to the president of our overseas division. He will be responsible for the operation of all of our foreign plants, and he and his wife will be able to reside in foreign countries for periods of several months with all expenses paid. In addition, the total compensation will be about $35,000.

We would like a well qualified manufacturing executive in the age range of 40 to 55 who is experienced in the mass production of metal products. Previous foreign experience is not essential.

A brief reply is sufficient giving present company, title, age and home address. All contacts with us will be kept confidential.

Box No. 411, STEEL

Penton Bldg. Cleveland 13, Ohio

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Metallurgists: Company engaged in basic process and pyrometallurgy requires several men for Production, Development and Quality Control who have some experience in one or more of the following: Smelting and Refining, Steelmaking or Electric Furnace Operation. Excellent opportunities for qualified men. Hospitalization, insurance and pension plan provided by Company. Plants located midwest, north and south. All replies held strictly confidential. Submit details resume to Box 413, STEEL, Penton Bldg., Cleveland 13, Ohio.

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10 Thousand Hard Maple Spools
4 inch traverse—1⅝ inch barrel
4 inch head—⅝ inch arbor
Usable condition—will consider reasonable offer.

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- 9" — Nat'l Upsetter w/air clutch, '42
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Parts and service supplied by more than 2200 dealers in the United States, Canada and in 82 foreign lands

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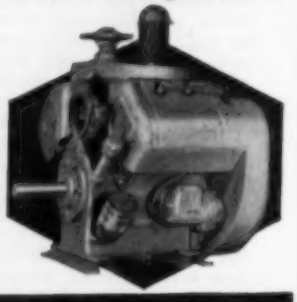
Just a couple of more good reasons why it pays to specify Wisconsin Heavy-Duty Air-Cooled Engines for your equipment.

Write for Engine Specifications Bulletin S-188, and a copy of our complete list of approved service stations throughout the world.



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A lot of production men have made such comments about this versatile little hydraulic press.

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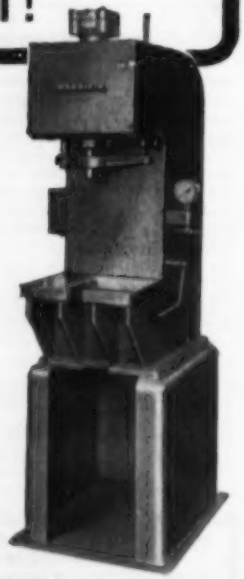
WRITE. Complete information and prices on the Hannifin line of 1- to 10-ton Hydraulic Presses will be sent on request.

*Price complete with motor and starter F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.



HANNIFIN
Hannifin Corporation, 523 S. Wolf Road, Des Plaines, Illinois

Pig Iron . . .

Pig Iron Prices, Page 155

Merchant pig iron business is brisk. Part of demand represents protective covering against a possible strike and higher prices at midyear.

While buying continues active, consumption has declined slightly because of a falling off in gray iron foundry operations in the East.

Foundries in western New York and northeastern Pennsylvania are working at about 80 per cent of capacity. Some are turning away business. The only soft spot in these districts is at foundries which produce largely for the auto industry.

Buffalo-made iron continues to move to New England where the Mystic blast furnace is expected to be down until July or August.

U. S. Steel Corp. has broken ground for an iron ore sintering plant at its Ohio Steel Works, Youngstown.

Iron Ore . . .

Iron Ore Prices, Page 163

Adverse ice conditions in the upper lakes region have been hampering the flow of iron ore to the lower lakes the past week or so. However, shipments this year to date are about 2 million tons greater than in the like period of 1955.

The movement in the week ended Apr. 30 totaled 2,274,874 gross tons, reports the Lake Superior Iron Ore Association. This brought the cumulative total for the 1956 season to 5,421,566 tons against 3,498,603 in the like period last year.

Stainless Steel . . .

Stainless Steel Prices, Page 154

Despite a reduction in automotive requirements, stainless steel sales are reported holding at a satisfactory level. Producers say consumers are building inventories, and a slow down in sales in early third quarter is anticipated.

Another large steelmaker, Jones & Laughlin Steel Corp., Pittsburgh, is giving the production of stainless serious study.

Crucible Steel Co. of America announced new extras to cover the cost of heat treating stainless steel bars and wire. The new extras vary from 3.5 cents to 12.5 cents per lb on wire rods and from 3.5 cents to 9.5 cents per lb on bars, depending upon size and hardness range specified. The new extras apply uniformly to all of the following chrome stainless grades: 403; 410; 414; 416, 420; 420-F; 422; 431; 436; 440-A; 440-B; 440-C; 440-F; 440-BM; 440-BMF. The extras are effective on new orders dated May 7.

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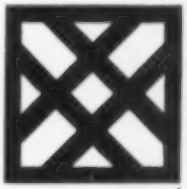
DUO-THERM selects H&K MORESQUE PATTERN PERFORATIONS to combine

- Heating Efficiency
- Maximum Strength
- Smart Design
- Cleanliness



The metal casing for this Duo-Therm Radiant Circulator was perforated by Harrington & King. H & K can supply perforated materials — with round holes, square holes, slots, ornamental patterns, oblong holes, oval holes — the pattern "just right" for your product. We will be glad to work with you on your perforating requirements.

Harrington & King's Moresque Pattern . . . one of thousands of patterns available for perforating metals for your products. For full range of H & K patterns, fill in and mail coupon to office and warehouse nearest you.

THE Harrington & King PERFORATING CO.

Chicago Office and Warehouse
5627 Fillmore Street
Chicago 44, Ill.

New York Office and Warehouse
118 Liberty Street
New York, N. Y.

Please send me—

- ☐ GENERAL CATALOG NO. 62
- ☐ STOCK LIST of Perforated Steel Sheets
- ☐ SAMPLES of Perforated Plastics and Paper
- ☐ PRICE INFORMATION (NOTE: Send specifications of perforated materials wanted. If necessary send drawings or sketches.)

NAME_____

TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE_____ STATE_____

want prompt service?

Every warehouse and branch office in Crucible's growing countrywide chain is geared to fill your special steel orders *quickly* . . . efficiently, too . . . no matter how large or small they are.

And – whether you want to stop by and pick up a single tool bit or drill rod from our shelves . . . or have us deliver a truckload tomorrow – every piece you buy is made to the Crucible high standard of quality. For all your special steel requirements, call Crucible – *big enough to serve you . . . small enough to want to.*

Stocks maintained of:

Rex High Speed Steel . . . ALL grades of Tool Steel (including Die Casting Die and Plastic Mold Steel, Drill Rod, Tool Bits, and Hollow Tool Steel Bars) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el, HY-Tuf, AISI Alloy . . . Onyx Spring, Hollow Drill Steel and other special purpose steels.

CRUCIBLE WAREHOUSE SERVICE

Crucible Steel Company of America

General Sales Offices, The Oliver Building, Mellon Square, Pittsburgh, Pa. Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Charlotte Chicago • Cincinnati • Cleveland • Dayton • Denver • Detroit • Houston • Indianapolis • Los Angeles • Milwaukee • Newark • New Haven • New York Philadelphia • Pittsburgh • Providence • Rockford • San Francisco • Seattle • Springfield, Mass. • St. Louis • St. Paul • Syracuse • Toronto, Ont.

24

Aetna-Built

CONTINUOUS GALVANIZING LINES

25th

UNDER WAY

WILL THE

26th

BE YOURS?

• The 26th line can be any process or type of Continuous Galvanizing in use today. Aetna-Standard has built more lines than all other manufacturers combined. If you are considering a continuous galvanizing line, Aetna has the facts, figures, production rates and other data on which you can base a sound decision. Why not make the 26th your line?

AETNA • STANDARD

THE AETNA-STANDARD ENGINEERING COMPANY

GENERAL OFFICES: PITTSBURGH, PA. **PLANTS: ELLWOOD CITY, PA., WARREN, OHIO**

CONTINUOUS GALVANIZING LINES • CONTINUOUS ELECTROLYTIC TINNING LINES • SIDE TRIMMING AND SHEAR LINES AND OTHER FINISHING EQUIPMENT • CONTINUOUS BUTT WELD PIPE MILLS • SEAMLESS TUBE MILLS • DRAWBENCHES AND OTHER COLD DRAW EQUIPMENT • ROLLS AND CASTINGS • EXTRUDERS, MILLS, PRESSES FOR RUBBER AND PLASTIC

New mill on TIMKEN® bearings tapers 10′ x 33′ aluminum sheets for aircraft wings

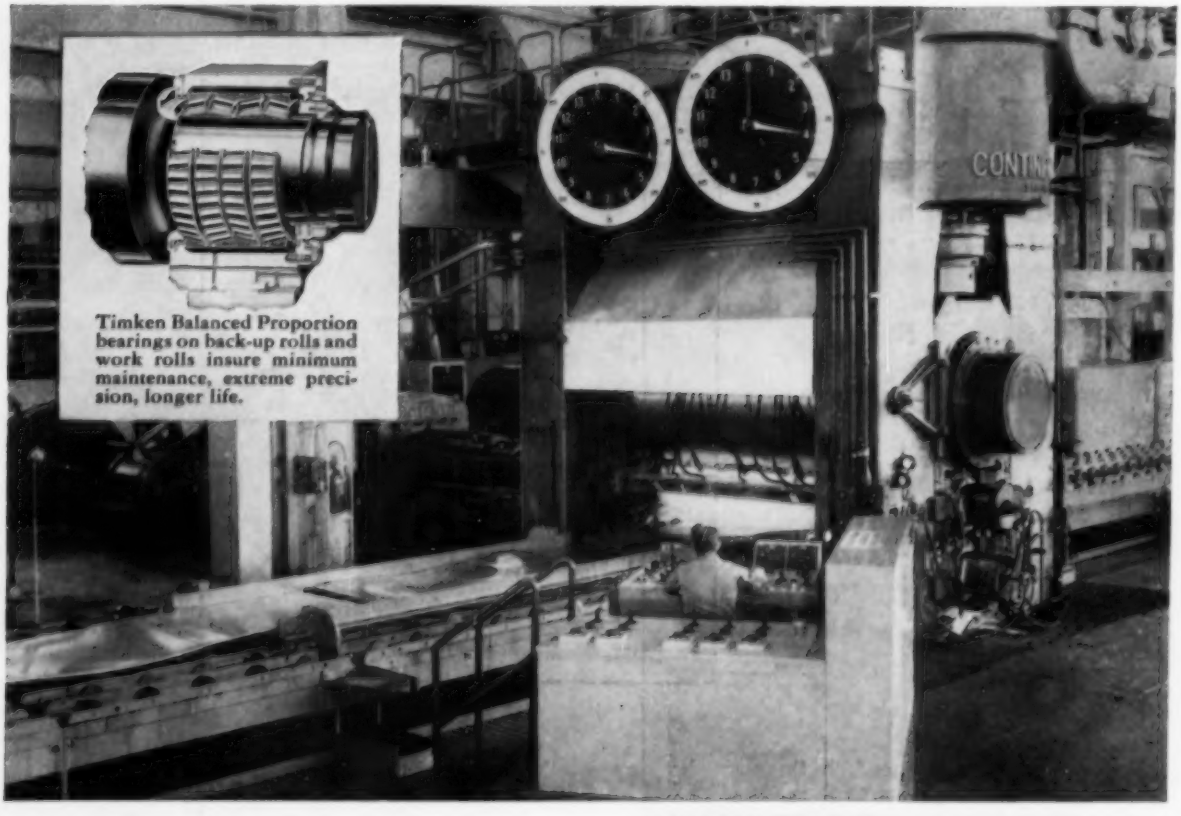
A 4-HIGH reversing mill, 32″ x 60″ x 144″, which tapers aluminum sheet and plate up to 10′ wide and 33′ long, is now in operation. This mill is used for the fabrication of tapered sheet and plate. Tapered sheet and plate products permit the fabrication of modern aircraft of increased speed and increased carrying capacity at no sacrifice in strength. Built by the Continental Foundry & Machine Division of Blaw-Knox Company, this huge new rolling mill uses Timken® tapered roller bearings on back-up rolls, work rolls, screw-downs and breaker blocks.

Timken balanced proportion bearings give this mill the extreme precision required in such rolling operations. Timken balanced proportion bearings have load ratings up to 40% higher than the same-size bearings in older designs. In some mills, they increase bearing life expectancy almost three times. And the mill can be stopped and restarted without altering or relieving screwdown pressures.

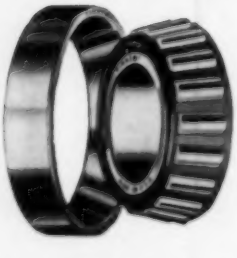
Timken bearings, because they're tapered, take both radial and thrust loads in any combination. They practically eliminate friction because they're designed by geometrical law to have true rolling motion. And made with extreme accuracy to conform to their design.

Always specify Timken bearings in the equipment you build or buy. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



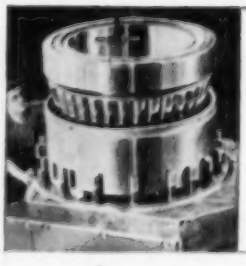
Timken Balanced Proportion bearings on back-up rolls and work rolls insure minimum maintenance, extreme precision, longer life.



TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS



ROLL NECK BEARING ENGINEERING SERVICE

Our field and service engineers have had years of experience with problems of roll neck bearing design and operation. They'll help you select bearings and design mountings.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ◫ AND THRUST ⊟ LOADS OR ANY COMBINATION ✳